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# *The* CANADIAN FIELD-NATURALIST

VOLUME LIV

1940

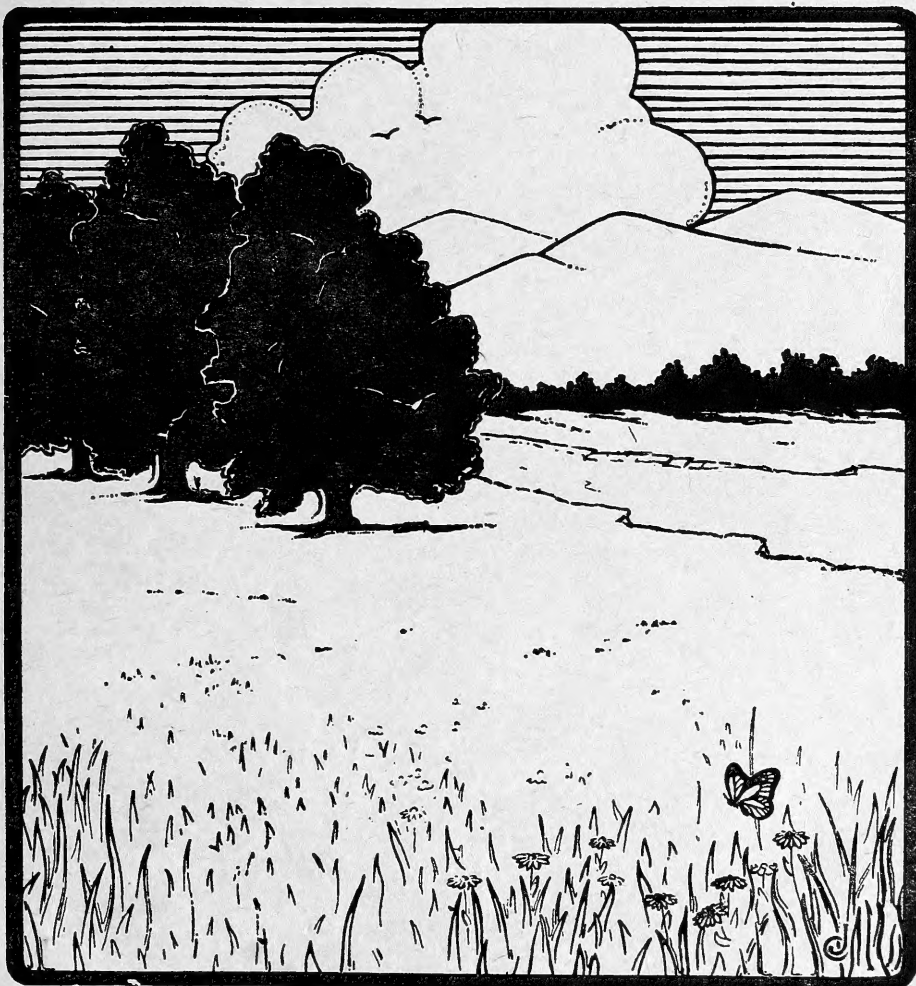
THE OTTAWA FIELD-NATURALISTS' CLUB  
OTTAWA, CANADA

35,343





# THE CANADIAN FIELD-NATURALIST



**OTTAWA FIELD-NATURALISTS' CLUB**

ISSUED JANUARY 31st, 1940

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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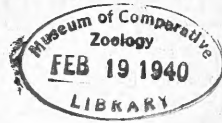
# The Canadian Field-Naturalist

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## LOUIS-BONAVENTURE LAVOIE 1882 - 1939

M. Louis-Bonaventure Lavoie, for the past twelve years Secretary of The Provancher Society of Natural History of Canada (*La Société Provancher d'Histoire Naturelle du Canada*), died in St. Sacrement Hospital, Quebec City, November 16, 1939, after an illness of several months. M. Lavoie was born at Ste.-Luce, Rimouski County, P.Q., September 8, 1882, and completed his classical studies at the College of Ste.-Anne de la Pocatière, where he received the degree of Bachelor of Arts, after which he enrolled in the Faculty of Medicine at Laval University, where he continued his studies with equal diligence. He married Mlle. Valéda Lavalée, of Ste.-Anne de la Pocatière, who with one son and four daughters, survives him.

For many years he was attached to the *Bureau provincial des statistiques judiciaires et municipales*, and on account of his deep knowledge of Canadian history was charged with the formation of a corps of historical guides for which he prepared special courses, and on the occasion of visits of distinguished guests to the Old Capitol and historic monuments, he filled the rôle of

official cicerone. He was one of the pioneers of The Provancher Society, and in addition to encouraging studies in natural history his talents were well employed in furthering another activity of the Society in promoting the marking of historical monuments and in establishing wild life sanctuaries in the Province of Quebec. Both in his official and private life his whole-hearted interest in the causes which interested him was a stimulation to his colleagues, and his extensive knowledge of his native Province and his wide acquaintance and friendship with persons in authority enabled him to accomplish much. He was always willing to undertake much of the drudgery which is necessary to keep any society active, kept the records and for many years edited the voluminous annual reports of The Provancher Society. His colleagues in Quebec regret his passing as a sincere man and a valuable associate, a useful citizen in any position where he could employ his activity and his talents, and the members of the Ottawa Field-Naturalists' Club join in mourning the loss of a friend of natural history work in Canada.—R.M.A.



## ARTHRITIS AMONG WOLVES

By E. C. CROSS\*



ASES of arthritis among wild animals have rarely been reported. Recently two cases have come to light among the wolves being prepared as skeletal material in the Royal Ontario Museum of Zoology. These seemed worthy of record.

In March, 1933, the carcass of a timber wolf (*Canis lupus lycaon* Schreber) was received by the museum from Mr. J. E. Coulson of Joe Lake, Algonquin Park, Ontario. When the skeleton of this animal was prepared the articular surfaces were found to be encrusted by deposits of bone, particularly in the case of the right front and left hind limbs.

Examination of the wolf skeletons in the museum's osteological collection disclosed a second specimen similarly affected. A short description of these two cases follows.

**TIMBER WOLF, (*Canis lupus lycaon* Sch.)** R.O.M.Z. No. 33-3-24-1.—This male wolf was captured in a wolf snare set on a rabbit trail by J. E. Coulson of Joe Lake, Algonquin Park, Ontario, in February, 1933. Signs of violent struggle were present but no faeces had been passed. The animal though not fat was well muscled and seemed in good condition. The stomach was found to be quite empty.

Bone deposition has advanced so far on the lateral epicondyles and olecranon fossa of the right humerus and proximal articulating surface of the right ulna that movement of the elbow joint must have been impeded and probably painful. The area for attachment of the biceps brachii and brachialis muscles is partly obliterated.

The left hind leg is in worse case. Heavy deposits of bone surround and surmount the epicondyles of the femur, and encroach on the trochlea, the intercondylar fossa and both condyles. Patches of bone surround and surmount both condyles in the tibia, partially dislocating the joint. Marked eburnation is present on articulating surfaces of tibia and femur. The sulcus muscularis has become a jagged-edged tube. This knee joint must have caused the animal great difficulty.

The vertebral articulating surfaces show traces of "lipping" but not sufficient to have caused any marked stiffness.

The teeth are those of an aged animal, channeled and grooved by use. The right lower canine and the upper left canine are worn down to the pulp cavity. The only evidence of trauma is the condition of the thirteenth right rib which had been fractured at some time. It had never knit but developed an articulating condition that allowed movement of the parts.

**TIMBER WOLF (*Canis lupus lycaon* Sch.)** R.O.M. Z. No. 25-11-10-1.—This male wolf was shot by J. M. Prentiss of White River, Ontario, on October 27th, 1925. Nothing is known of its condition at time of capture.

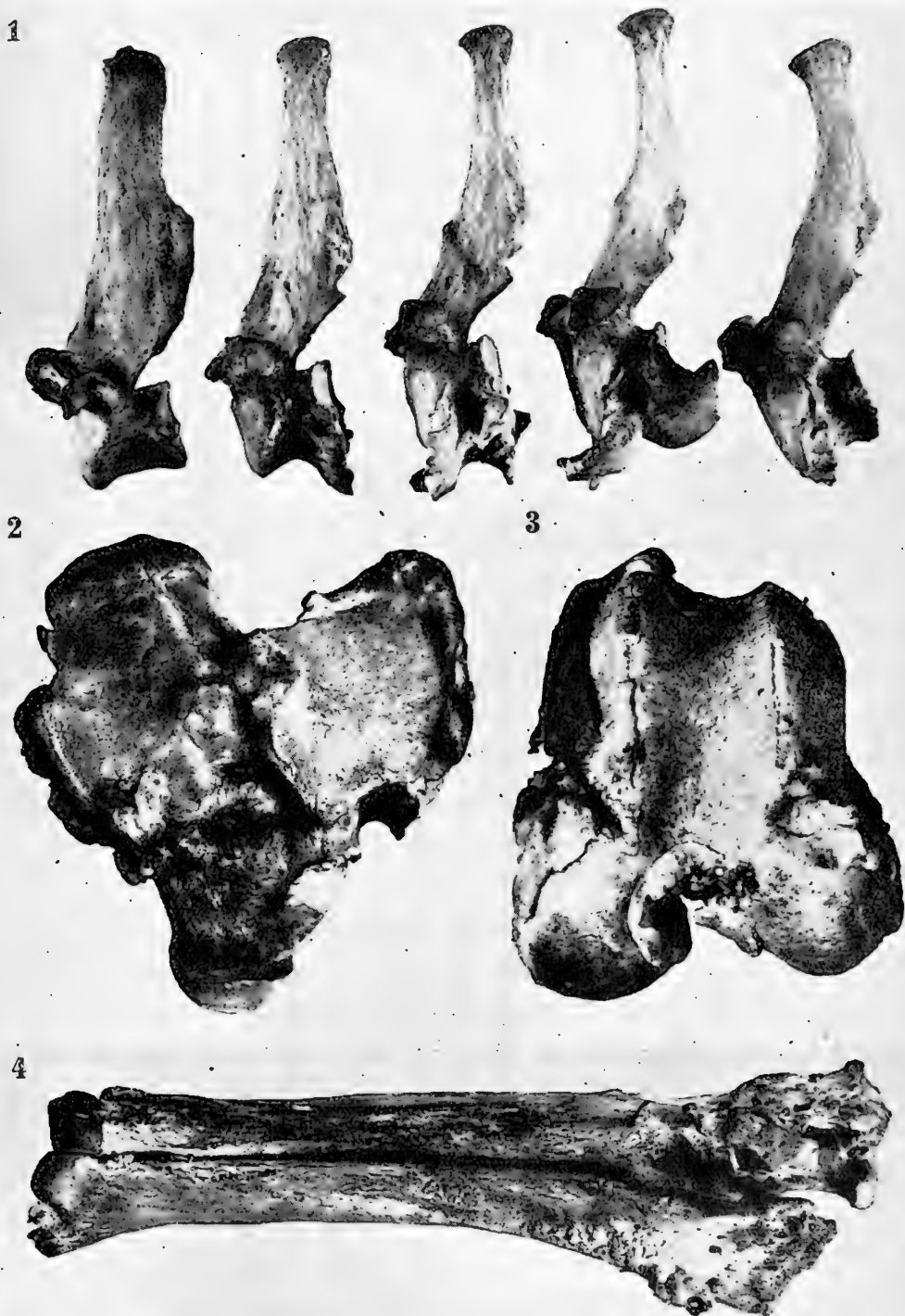
Lipping is present on or about all limb joints but in amounts so slight as to have caused no inconvenience except in the case of the hind feet. In the left pes the articulating surfaces of the fourth and fifth tarsals, metatarsals and phalanges have been destroyed by lesions and the joints of the other toes are badly encrusted by bone deposits. The joints of the right pes are also more or less encrusted by bone and the fourth and fifth metatarsals have become ankylosed together.

The vertebral column of this animal is markedly affected. The cervicals are clean except for the seventh, the first trace of lipping appears on it and increases progressively, with the third, fourth, fifth, sixth and seventh costal vertebrae very badly encrusted. Movement of these five vertebrae must have been both difficult and painful. This lipping suddenly disappears with the eighth costal and the remaining costal vertebrae are normal. The first four lumbar vertebrae show slight traces of lipping but not enough to have caused the animal any difficulty.

The sacrum had been fractured at some time and had not completely knit at the time the animal was killed. Cracks still show on the dorsal surface. On the ventral surface the sacrum has become immovably ankylosed to the coxal bones, and masses of bone deposit have built up along the points of juncture. The iliac crest of the right coxal shows encrustation by bone spicules.

\*Royal Ontario Museum of Zoology.





1. R.O.M.Z. No. 25-11-10-1.  
*The third, fourth, fifth, sixth and seventh costal vertebrae.*
2. R.O.M.Z. No. 33-3-24-1.  
*Proximal articulating surface of left tibia.*

3. R.O.M.Z. No. 33-3-24-1.  
*Distal articulating surface of left femur.*
4. R.O.M.Z. No. 25-11-10-1.  
*Ventral surface of fourth and fifth left tarsals showing destruction of articulating surfaces.*

The teeth are badly worn and broken. The canines are worn down to the pulp cavity. In the upper jaw only three incisors remain and these are stumps. The lower right fourth premolar is split in half longitudinally leaving the pulp cavity exposed, the lower right third premolar is broken off, the upper right third premolar is broken, the upper left second premolar is broken off and of the upper left fourth premolar only fragments of the roots remain. The fractured areas of these teeth have a worn appearance that could have been received only by use subsequent to breakage.

The proximal phalanges of the fourth and fifth digits of the left pes have been shattered at some time and knit in distorted fashion. The left fibula has been broken, ankylosed to the tibia below the fracture and left too short to reach the proximal articulation with the tibia. The tenth left rib, the ninth right rib and the eleventh right rib have all been broken and knit again.

Pathological conditions such as found in these two wolves involving destruction of articulating surfaces by lesions, eburation of articulating surfaces, and deposition of bony excrescences on or about joints are characteristic of osteoarthritis or, as it is sometimes called, chronic degenerative arthritis.

Most students of this form of chronic arthritis appear to agree that it is essentially a degenerative process occurring in individuals of advanced age, differing in this respect from those forms of arthritis arising from bacterial infection. However, osteo-arthritis may be set up as a late stage in infectious arthritis or may become secondarily infected from the bony changes so characteristic of the disease.

"The cause of degenerative arthritis is not known. . . . Probably the most important predisposing factor in the etiology of this condition is old age. . . . Next to age, the most important etiological factor is trauma. Some form of trauma

can be demonstrated in nearly every case. . . ." (*Oxford Monographs on Diagnosis and Treatment*, volume six, page 151).

The factor responsible for the onset of arthritis in the Algonquin Park wolf would seem to be old age. This wolf was definitely an aged animal and the only evidence of trauma, the broken rib, must from its condition be placed some distance back in the animal's past and accordingly doubtfully concerned in the arthropathy existing at the time of death.

The White River wolf, judged by the condition of skull sutures and skeleton was mature but not aged, a younger animal than the Algonquin Park specimen. The defective dentition appears to be due to breakage rather than to normal wear. The obvious suggestion is that this wolf was caught in a trap at some period in its history and shattered its teeth biting at the steel trap, a well known habit of trapped wolves.

The injury to the left hind foot may very well have been caused by a steel trap. In any event the condition of the bones of the left pes shows that an acute infection developed there and resulted in severe lesions and consequent destruction of tissue.

The fracture of the sacrum must have been a serious injury and from the unhealed condition of the break probably occurred not long before the animal was shot. The minor injuries to fibula and ribs are thoroughly knit and must be assigned to an earlier date.

But, neither about the unhealed fracture lines of the sacrum nor about the healed breaks of ribs and fibula is there evidence of infection. In view of this it may be assumed that these injuries were either only slightly or not at all involved in the onset of the arthritis in this animal and that the chief etiological factor was the injury to the left pes and the severe infection which followed.

## THE NEED FOR GRASSLAND RESERVATIONS AND GRASSLAND RESEARCH

By V. E. SHELFORD



FUTURE generations have a right to see the plains animals, the bison and antelope, in a wild state. There would be many distressing appeals from botanists if red-woods, beech and giant cedars and other trees with their associated shrubs and herbs were rapidly coming under cultivation as nursery stock.

It is cogent to ask if the larger game animals of the Great Plains are not rapidly undergoing domestication. One who makes a brief study of the Great Plains big game reserves is likely to be impressed that the bison and antelope are rapidly being domesticated in all of them, due to

- (1) Winter feeding on hay, and
- (2) Various schemes for regulating breeding and care of young in close quarters.

The reserves are at the same time overgrazed to a considerable degree. One of the largest of these, at Wainwright, Alberta, is very badly overgrazed (1939). Here the smaller animals are accordingly deprived of shelter and are wanting or deficient as to numbers. Some of them, such as the badger, small vertebrates and various invertebrates are threatened with extirpation.

This brings us to the consideration of the size of area necessary to prevent domestication of these animals and their associates. Taking the minimum daily range from home and normal wandering of a community of plains animals, for example, in Nebraska, 1,250,000 acres is found to be near the minimum. Men with large experience regard 1,000,000 acres as the ideal area at which to aim in the case of plains animals. Animals which roam the National Forests and connected National Parks of the United States have very much larger areas available. Boerker's list of the National Forests as of 1917 shows more than half of them with 800,000 acres of actual Forest Service-owned land. The Kaibab Forest contained 1,072,375 acres, giving ample range to the deer, the Kaibab squirrel, etc; probably not over one-fourth of the area is grazed by cattle, leaving 800,000 acres for the wild animals, recreation, etc.

This need has been realized by animal ecologists and students of wildlife for some time. In the United States it was brought to more general attention at about the same time by the National Park Service and a committee of the Ecological

Society. This resulted in the investigation of 13 areas, four or five of which were considered suitable for a Great Plains National Monument.

The rodents of the grassland, particularly ground squirrels, prairie dogs, kangaroo rats, and jack rabbits, have long constituted a problem in grazing areas as competitors with livestock. Their increase in the plains is well described by Merriam in the Yearbook of the United States Department of Agriculture for 1901. He states that on many parts of the plains prairie dogs were more abundant in 1900 than formerly and their colonies had overspread extensive areas previously unoccupied. This was due to the aid of the settlers, (1) by decreasing the animal's natural enemies, and (2) by increasing the food supply. The settler waged warfare against the coyotes, kit foxes, badgers, ferrets, weasels, hawks, owls, snakes, and other predatory animals which had previously held the prairie dogs in check. "The prairie dogs have multiplied until they have become a pernicious enemy to agriculture.

"For example, one South Dakota settler states that about fifteen years ago his children noticed two or three burrows about a mile from his house, and now they have spread over and occupied a full quarter section (160 acres), having surrounded his house and taken possession of all the land near it." Merriam cites many examples of losses, among others, that of a cattle ranch which had its carrying capacity cut from 1,000 cattle to 500 by an increase of prairie dogs, which extended to cover 300 square miles, causing a decrease in population and the abandonment of a post office.

The natural enemies of the plains rodents have been decimated through prejudices and by the use of poisons. Also, flesh-eating animals usually have good coats and are trapped for fur. This applies to the black-footed ferret, the present status of which appears to be very much in doubt. Merriam states that this animal alone was capable of holding plains rodents in check. The only report of specimens in recent years comes to the writer from Hamilton County, Kansas, which is near the Colorado line. Merriam also described the method of attack of the kit fox. Of this animal, Seton says, "Harmless as a rabbit, he is harmless to man and man's interests . . . readily takes

the poison bait used nowadays for killing coyote." The writer has seen only one of these in recent years and the status is difficult to determine. The badger is somewhat disliked by cowboys because horses may step into its holes with serious results. The prairie dog holes are nearly equally dangerous and this rodent increases when the badger is absent. The badger has been practically extirpated over most of the plains area, in part due to the value of its fur. Similar processes have reduced the hawks and owls of the Great Plains along with all the other flesh-eaters. Many are likely to disappear completely unless some special means is taken to preserve them. When one reads Sweetman's book, *Biological Control of Insects*, he wonders why this idea was not extended to control of rodents in grassland areas. A large undisturbed area would afford opportunity for the study of natural biological control of rodent outbreaks and would quite possibly eliminate the constantly recurring exhaustive and dangerous application of poison. For this purpose, an area of natural plains grassland not overgrazed by large animals is essential.

The life histories, water relations, and competition of grasses is also in need of extended investigations. The problems of the origin and original habitat of the species occurring as pests under agricultural conditions often throws much light on causes of outbreaks. For example, the pale western cutworm, a pest of cultivated grain, originally lived about the dust wallows of the bison and spread to plowed fields where similar conditions occurred. This fact was discovered by the Canadian entomologists, who had opportunities to observe natural conditions superior to those afforded in the United States. All these problems require long-time observation on lands where wild life is managed on a hands-off basis.

The greater part of a century has passed since Darwin published his famous work on the origin of species and as yet no lands nor combined natural outdoor and laboratory facilities have been provided to study competition and the interchange of forces, which made up the basis of his theory. With the development of modern ecology and ecological processes, methods have come into use whereby studies of biotic interaction may profitably be carried on alone or in combination with laboratory studies. Various scientists have long hoped for lands and a laboratory where the interactions of land plants and animals and their physiological relations to climate can be studied just as the marine plants and animals

are investigated in seaside biological stations. Pure science studies of terrestrial animals may well have much more intimate relations to human needs than marine inquiries. The sea has attracted the efforts of scientific men and the funds of granting bodies and philanthropists perhaps to an extent disproportionate to its human value. It has been demonstrated at the State University of Iowa that grassland grasshopper eggs may be used as a material for basic physico-chemical research rivaling the sea urchin egg. The investigators at the University of Chicago have made use of striped ground squirrels taken from their native grassland haunts, for fundamental studies in hormones and for studies of the environmental factors that influence the important function of reproduction.

A grassland laboratory would possess facilities for research not available in some other types of land, such as forest or agricultural land. The great complication of forest vegetation makes many types of shelter and many niches affording protection from the elements to animals and smaller plants, which render observations difficult. Tundra shares the advantages of grassland for researches involving field observations. These barren lands, however, are in a climate forbidding to continued scientific research and are remote from academic centers. Grassland, however, affords unrivaled opportunities for scientific biological study for the following reasons:

- (1) Grassland allows full visibility of the more important larger animals and plants.

- (2) Niches and hiding places for animals, such as tree tops, fallen and hollow trees, and dense thickets do not occur in Great Plains areas to retard observation.

- (3) The life span of the principal plants is about one-tenth that of forest trees and this greatly facilitates long time observation because of the more rapid turnover and hence, the quicker response to climatic fluctuations.

- (4) The grassland flora and fauna have intimate relations to the general problems of agriculture and human welfare on the Great Plains.

- (5) Grassland constitutes about 40 per cent of the original vegetation of the earth's land surface and is of great importance to mankind in general.

- (6) It has been much less studied than forest.

- (7) Stable primeval areas or semi-primeval areas of large size are rapidly disappearing. In

another generation the program proposed by biological scientists may perhaps be impracticable.

(8) The field is unencumbered by organized pure science research projects.

(9) It is a vegetation type in which ecological interest is great and much important plant ecological work has been done on the moist eastern portion of the plains but all animal relations and their interactions with plants have been neglected.

(10) The problems of wind and water erosion of soil and the attendant dust movement are essentially biological problems.

(11) Suitable lands are of *low* economic value.

(12) Its climate is suitable for the work of investigators.

The plans of interested scientists have called for an undisturbed check area which could be under observation for a sufficiently long period to permit an analysis of drouths and dust storms, and rodent, predator, and grasshopper outbreaks that occur separated by rather long intervals such as 30 to 50 years or more.

Agricultural lands are subject to such erratic overturn that causes of cyclic phenomena cannot ordinarily be followed in a scientific manner. Game preserves and other small areas are, necessarily or unnecessarily, so managed as to obscure natural phenomena and render scientific conclus-

ions unavailable or uncertain. Students of grasshopper outbreaks and, to a lesser extent, infestations of rodents desire large areas to follow the normal population of these pest animals. The need of a large area has been voiced by many including grasshopper specialists, whose scientific results require freedom from *marginal effects* in this migratory group. For example, a tract of a few dozen sections of land surrounded by cultivated and overgrazed areas is so completely sprinkled with wind borne organisms as to render conclusions as to natural trends uncertain.

The hope is that in the not too distant future scientific men can interest government agencies and granting bodies, which have helped with such projects in the past, to cooperate in providing land and facilities for basic terrestrial biological research. For example, an endowed laboratory could be set up on land of its own for the purpose of carrying on observations continuously. Such research would include analyzing the physiology of the animals in relation to weather and climate, studies of competition, natural selection, reproduction, hormones, etc. In the United States, for example, the National Park Service is interested in setting up a Great Plains National Monument large enough to prevent domestication of plains animals and to be managed on a hands-off basis. A laboratory adjacent to such an area would have many advantages.

## A PRELIMINARY LIST OF THE PLANTS ON BONAVENTURE ISLAND

By J. ADAMS



BONAVENTURE is the only island of considerable size around the coast of the Gaspé Peninsula between Father Point and the western limit of the Bay of Chaleur near Matapédia. The island is, about three miles long by a mile and a half in width, and is distant about three miles from the mainland. While there are several elevations in the Peninsula over 4,000 feet, the highest point in the island is only about 400 feet above sea level. In shape Bonaventure Island, seen from Percé, resembles a stranded whale, the ground gradually sloping down towards the side nearest the mainland. The entire coast line is rocky, particularly on the outer side where the narrow ledges on the perpendicular cliffs are tenanted by myriads of sea fowl which have given the island its fame

as a well-known bird sanctuary. The rock is composed of sandstone dating apparently from the Devonian Period.

No account seems ever to have been published of the plants on this interesting island. As I happened, in company with some American friends, to pay a short visit to the island on August 15, 1935, I availed myself to the opportunity to make some notes on the flora. However, this is only a preliminary list and may serve as a basis to some botanist for further investigation. The total species recorded here amount to 94 in number. Of these a considerable number, distinguished by an asterisk, are evidently introduced species, found chiefly on cultivated plots belonging to the residents.

The classification of families adopted follows that of the 11th edition of Engler and Diels' *Syllabus der Pflanzenfamilien*, 1936 the names in each of the principal groups being placed in alphabetical order for easy reference.

Perhaps the most interesting plant noted as regards its habitat was the Sea Marram Grass (*Ammophila arundinacea*), a typical plant of shifting sand-dunes, but found on Bonaventure Island at only one spot near the top of the cliffs. As neither Ragweed nor Poison Ivy was observed it is highly probable that both are absent as in the case of the adjacent mainland.

## PTERIDOPHYTES

### EQUISETACEAE

*Equisetum sylvaticum* L.

### POLYPODIACEAE

*Pteridium latiusculum* (Desv.) Maxon.

*Thelypteris Phlegopteris* (L.) Slosson.

## GYMNOSPERMS

### CUPRESSACEAE

*Juniperus horizontalis* Moench.

### PINACEAE

*Picea canadensis* (Mill.) B.S.P.

## ANGIOSPERMS

### 1. MONOCOTYLEDONS

### CYPERACEAE

*Carex* sp.

*Scirpus rubrotinctus* Fern.

### GRAMINEAE

\**Agropyron repens* (L.) Beauv.

*Ammophila arundinacea* Host. (*A. breviligulata* Fern.)

*Calamagrostis canadensis* (Michx.) Beauv.

\**Poa annua* L.

### IRIDACEAE

*Iris versicolor* L.

*Sisyrinchium angustifolium* Mill.

### JUNCACEAE

*Juncus bufonius* L.

### LILIACEAE

*Maianthemum canadense* Desf.

*Smilacina stellata* (L.) Desf.

### LILIACEAE

*Streptopus amplexifolius* (L.) DC.

*Streptopus roseus* Michx.

*Zygadenus chloranthus* Richards.

### ORCHIDACEAE

*Habenaria* (? *hyperborea* (L.) R.Br.)

*Spiranthes Romanzoviana* Cham.

### POTAMOGETONACEAE

*Triglochin maritima* L.

## 2. DICOTYLEDONS

### A. ARCHICHLAMYDEAE

### ARALIACEAE

*Aralia nudicaulis* L.

### BALSAMINACEAE

*Impatiens biflora* Walt.

### BETULACEAE

*Alnus Alnobetula* (Ehrh.) K. Koch

### CARYOPHYLLACEAE

*Arenaria lateriflora* L.

\**Cerastium vulgatum* L.

\**Stellaria media* (L.) Cyrill.

### CHENOPODIACEAE

\**Atriplex patula* L.

\**Chenopodium album* L.

### CORNACEAE

*Cornus canadensis* L.

*Cornus stolonifera* Michx.

### CRUCIFERAE

\**Brassica arvensis* (L.) Ktze.

\**Capsella Bursa-pastoris* (L.) Medic.

### ELAEAGNACEAE

*Shepherdia canadensis* (L.) Nutt.

### EMPETRACEAE

*Empetrum nigrum* L.

### LEGUMINOSAE

*Lathyrus maritimus* (L.) Bigel.

*Vicia Cracca* L.

### OENOTHERACEAE

*Epilobium angustifolium* L.

### POLYGONACEAE

*Polygonum aviculare* L.

\**Polygonum Convolvulus* L.

\**Polygonum Persicaria* L.

\**Rumex Acetosella* L.

\**Rumex obtusifolius* L.

*Rumex pallidus* Bigel.

### RANUNCULACEAE

\**Ranunculus acris* L.

*Thalictrum polygamum* Muhl.

### ROSACEAE

*Agrimonia gryposepala* Wallr.

*Fragaria virginiana* Duchesne

*Potentilla anserina* L.

*Potentilla fruticosa* L.

*Potentilla pectinata* Raf.

*Potentilla tridentata* Ait.

*Rubus triflorus* Richards.

### SAXIFRAGACEAE

*Ribes oxycanthoides* L.



## UMBELLIFERAE

- \**Carum Carui* L.  
*Conioselinum canadense* T. & G.  
*Heracleum lanatum* Michx.  
*Ligusticum scoticum* L.  
*Sanicula marilandica* L.

B. METACHLAMYDEAE  
 (SYMPETALAE)

## CAMPANULACEAE

- Campanula rotundifolia* L.

## CAPRIFOLIACEAE

- Sambucus* sp.

## COMPOSITAE

- Achillea Millefolium* L.  
*Anaphalis margaritacea* (L.) B. & H.  
 \**Arctium minus* Bernh.  
*Aster umbellatus* Mill.  
 \**Chrysanthemum Leucanthemum* L.  
 \**Cirsium arvense* (L.) Scop.  
 \**Cirsium lanceolatum* (L.) Hill  
*Eupatorium purpureum* L.  
*Hieracium canadense* Michx.  
 \**Hieracium pratense* Tausch.  
 \**Leontodon autumnalis* L.  
*Prenanthes altissima* L.  
*Senecio* (?*Balsamitae* Muhl.)

- \**Senecio vulgaris* L.  
*Solidago canadensis* L.  
*Solidago macrophylla* Pursh  
 \**Sonchus arvensis* L.  
 \**Sonchus oleraceus* L.  
 \**Tanacetum vulgare* L.  
 \**Taraxacum officinale* Weber

## ERICACEAE

- Vaccinium canadense* Kalm  
*Vaccinium pennsylvanicum* Lam.  
*Vaccinium Vitis-Idaea* L.

## GENTIANACEAE

- Halenia deflexa* (Sm.) Griseb.

## LABIATAE

- \**Galeopsis Tetrahit* L.  
*Mentha canadensis* L.  
*Prunella vulgaris* L.

## LENTIBULARIACEAE

- Pinguicula vulgaris* L.

## PLANTAGINACEAE

- Plantago major* L.  
*Plantago maritima* L.

## SCROPHULARIACEAE

- Euphrasia* sp.  
*Rhinanthus Crista-galli* L.

<sup>a</sup>  
**ON SOME PLANTS FROM SALISBURY ISLAND, COLLECTED BY  
 MAJOR L. T. BURWASH IN 1924 AND BY THE  
 HON. J. N. S. BUCHAN IN 1938**

By **NICHOLAS POLUNIN**



SALISBURY ISLAND is a land-mass of some 500 square miles lying around lat. 63° 40' N. and long. 77° W. off the north-western coast of Quebec. In spite of its considerable size, and of its position near the junction of Hudson Bay and Strait, its flora appears to have remained entirely unknown until 1924, in which year Major L. T. Burwash, Chief Investigator of the Northwest Territories Branch of the Department of the Interior, during a brief visit to survey the island, made a small botanical collection towards the end of July. This collection is now in the possession of the National Herbarium of Canada, where during a recent visit to Ottawa I was able to work through it. Although consisting of a greater number of individual specimens, it comprises only the following 9 different species of vascular plants:

*Alopecurus alpinus* Sm.

- Poa arctica* R. Br.  
*Oxyria digyna* (L.) Hill  
*Cerastium alpinum* L.  
*Stellaria longipes* Goldie  
*Saxifraga cernua* L.  
*Saxifraga caespitosa* L.  
*Cassiope tetragona* (L.) D. Don  
*Vaccinium uliginosum* L. var. *alpinum* Bigel.

Comparison with other areas which I have lately investigated in the same general region (see *Journal of Botany* vol. 72, pp. 197-204, 1934, and vol. 76, pp. 93-103, 1938; also *Canadian Field-Naturalist* vol. 51, pp. 111-114, 1937 and vol. 52, pp. 5-9, 1938) indicated that this could hardly represent more than a small proportion of the actual flora of Salisbury Island; indeed all of these plants are so plentiful throughout the southern portion of the Canadian Eastern Arctic and Subarctic that their occurrence on Salisbury

Island is not considered worthy of mention in the general "flora" of the region, which is being published by the Department of Mines and Resources in the National Museum Bulletin Series.

Accordingly I was much interested, on meeting in July, 1938, an old friend, the Hon. John N. S. Buchan, to learn that although he would be spending most of the next twelve months at the Hudson's Bay Company's trading post at Cape Dorset, on the south coast of Baffin Island, he would have opportunities of travelling extensively and hoped to visit Salisbury Island, where, among other places, he would collect for me all the plants he could find. The resultant parcel of plants reached me in England just after the outbreak of war—which Mr. Buchan already forecast in a letter in which he deplored having to return to "a world so strangely tortured by man"—and contained a useful collection from Cape Dorset and, to my delight, a still more important one from Salisbury Island. (Most of Mr. Buchan's travelling had been done by boat or in winter, so his botanical harvest from other places was not great).

Cape Dorset has been visited several times recently by biologists during Canadian Eastern Arctic Expeditions (e.g. by Mr. J. D. Soper in 1926, by Dr. M. O. Malte in 1928, and by myself in 1934 and 1936), so its flora is relatively well known. Nor did Mr. Buchan's collection establish any new records from this place. However, his specimens from Salisbury Island, which numbered about 30 and had been collected during the period September 2-12, 1938, on "rocky hills, beaches, bogs", repeated only three of the previous records but added no less than 12 species to the known vascular plant flora. The repetitions were of *Cerastium alpinum*, *Stellaria longipes* and *Saxifraga caespitosa*, three of the most abundant and typical of arctic plants. The additions were as follows:

*Lycopodium Selago* L.

*Trisetum spicatum* (L.) Richt. var. *Maidenii* (Gand.) Fernald

*Elymus arenarius* L. var. *villosus* E. Meyer (approaching var. *villosissimus* (Scribn.) Polunin MS.)

*Salix reticulata* L.

*Salix herbacea* L.

*Salix arctica* Pall. (s.l.)

*Arenaria peptoides* L. var. *diffusa* Hornem.

*Saxifraga rivularis* L.

*Saxifraga tricuspidata* Rottb.

*Saxifraga oppositifolia* L.

*Dryas integrifolia* M. Vahl

*Astragalus alpinus* L.

Thus 21 species of vascular plants are now known to occur on Salisbury Island, all being of widespread arctic or subarctic distribution. But the indications are that the soil in places is relatively rich, the growth of some plants being quite luxuriant in spite of the exposed situation, and so this figure probably still represents only a small portion of the actual flora. Thus all of these plants are well known from other places nearby, which again all have a vastly larger flora. The cryptogams of Salisbury Island also appear, as one would expect, to be of arctic affinity, for the following mosses and lichens are identifiable among debris clinging to the more luxuriant plants in Mr. Buchan's collection:

*Alectoria ochroleuca* (Ehrh.) Nyl.

*Cetraria Delisei* (Bory.) Th. Fr.

*Cetraria nivalis* (L.) Ach.

*Thamnolia vermicularis* (Sw.) Ach.

*Polytrichum juniperinum* Willd.

*Rhacomitrium lanuginosum* (Hedw.) Brid. very plentiful.

In conclusion it remains for me to thank Mr. Buchan for his contribution to our knowledge of the botany of the Canadian Eastern Arctic, and for his beautifully preserved and carefully labelled specimens; these are being divided between the Herbarium of the British Museum, who kindly supplied the necessary collecting material, and the appropriate unit of the Herbaria of Oxford University, of which I have the privilege of being Fielding Curator and Keeper.

**SIXTY-FIRST ANNUAL MEETING OF  
THE OTTAWA FIELD-NATURALISTS' CLUB  
REPORT OF COUNCIL**

---

**MEETINGS**—Since the last Annual Meeting there have been five Council Meetings with an average attendance of ten members. These meetings were held at the following places: January 10th, at the home of Mr. A. E. Porsild; March 25th, at the home of Mr. and Mrs. Hoyes Lloyd; May 22nd, at the office of Mr. Hoyes Lloyd; September 19th, at the home of Mr. A. E. Porsild; November 9th, at the home of Mr. A. E. Porsild.

**EXCURSIONS**—A committee meeting was held early in the year at the home of Dr. and Mrs. H. Bowers, when excursions for the spring months were arranged; another in the autumn at the home of Mr. and Mrs. W. H. Lanceley to plan autumn excursions; and one at the home of Mr. and Mrs. C. R. Lounsbury, later in the autumn to arrange the winter programme.

Lectures since last annual report were held at St. Patrick's College, as listed below, with attendance averaging about thirty. Slides and sometimes specimens illustrated the topics presented. December 15—"Keeping an Aquarium" by Dr. H. Bowers.

January 19—"Bird Life on the Canadian Labrador" by Dr. H. F. Lewis.

February 16—"Mushrooms of the Ottawa District" by Dr. J. W. Groves.

March 16—"Some Aspects of Bird Banding" by Dr. R. E. DeLury.

April 20—"Geology of the Ottawa Lowlands" by Dr. Alice Wilson.

November 16—"Dominion Arboretum and Botanic Garden" by Dr. H. A. Senn.

Excursions 1939—Omitting outings cancelled by bad weather these were:

April 22—Rideau River west from Billings Bridge.

May 6—Base Line Quarries.

May 13—Taylors Hill.

May 27—Fairy Lake via Aylmer Road.

June 10—Britannia.

June 24—Pinks Lake.

October 31—Pointe Gatineau.

The Committee's financial report shows a balance of \$20.15 turned over to the Club Treasurer. This comprises receipts from excursion tickets amounting to \$18.00, and advance from the Treas-

urer of \$10.00; and expenditures on postage and circular post-cards, together with a deficit of 65 cents on one excursion, making a total of \$7.85. There are at present 17 ticket holders for 1939, 7 of whom are new this year.

**PUBLICATIONS**—The Publications Committee reports a successful year's activities in matters coming under its jurisdiction. The Club's publication under a new editor maintains its function of affording a medium for publishing Canadian natural history. Special efforts were devoted to encouraging university libraries to complete their files of our publication, and, as the Treasurer's report will show, considerable success attended this campaign. A small sum was expended on labour for keeping the stock-room containing back numbers in order. This work was well done and a complete check-list of stock on hand prepared.

**FINANCE**—The sale of one complete set, and of several long runs of back numbers of the *Naturalist* enabled the Club to close the year with a small cash balance in the Current Account.

Every economy in administration has been practised. The continued financial support of the friends and members of the Club is deeply appreciated, and is indicative of the widespread interest in the Natural History of Canada.

**LECTURES**—The Annual Meeting of the Club, on December 6, 1938, was addressed by Dr. C. H. D. Clarke, of the National Parks Bureau, who presented a very informative and interesting illustrated lecture on "Thelon Game Sanctuary, Northwest Territories".

Under the distinguished patronage of Their Excellencies, the Governor-General and The Lady Tweedsmuir, and in the presence of Her Excellency, a lecture entitled "Adventures with Canadian Birds", illustrated with original motion pictures, some of them in natural colour, showing Canadian birds in their native haunts, was given by Mr. Cleveland P. Grant, of the Baker-Hunt Museum, in the Auditorium of Glebe Collegiate Institute, Ottawa, under the auspices of the Club, on February 20, 1939. To make it possible to pay the lecturer a reasonable fee, a moderate charge was made for admission to this lecture. The result of this policy, as compared with the

previous practice of receiving a silver collection at the door, was that total receipts were considerably increased, but the audience was reduced in size and expenses were unavoidably increased so much that the net result, on the financial side, was a slight loss.

The Lecture Committee again co-operated with the Excursions Committee in connection with the series of local lectures presented under the Club's auspices during the winter season.

**BIRD CENSUS**—The local bird census was taken on December 24, 1938, with 21 persons taking part. There were 27 species and more than 3,200 individual birds reported. The report was published in both *The Canadian Field-Naturalist* and *Bird-Lore*.

**INTERNATIONAL COMMITTEE FOR THE PROTECTION OF BIRDS OF THE WORLD**—Mr. Hoyer Lloyd and Dr. H. F. Lewis were representatives. Mr. Lloyd was honoured by being elected Vice-President of the Committee.

**EDITORS**—Dr. C. H. D. Clarke was appointed editor of *The Canadian Field-Naturalist*. The following associate editors were also appointed: Mr. A. LaRocque in Conchology and Dr. W. A. Bell in Palaeontology.

**MEMBERSHIP COMMITTEE**—No activities to report.

**ACKNOWLEDGEMENTS**—The Council wishes to take this opportunity to express its appreciation of the work and co-operation of many of its members, and to the authorities of St. Patrick's College for the generous provision of accommodation for the winter lectures. Council also wishes to thank all leaders of excursions and lecturers throughout the year. Rev. Fr. Banim organized an enthusiastic study group which met for excursions on alternate Saturdays during the winter season. This group had as an objective the study of trees, and Mr. J. M. Robinson gave much valuable assistance.

The Club recently received a donation of many early numbers of *The Ottawa Naturalist* from Mr. A. E. Atwood, a former president of the Club. This gift was much appreciated by Council, and it is hoped that others will donate their *Naturalists* to the Club if they no longer have need of them.

In the year to come, which will be burdened by the present international situation, it is hoped that the co-operation and enthusiasm of every member of the Club will support the Council of 1940 as it has that of the past year.

C. R. LOUNSBURY, Secretary.

## STATEMENT OF FINANCIAL STANDING OTTAWA FIELD-NATURALISTS' CLUB, NOVEMBER 30, 1939 CURRENT ACCOUNT

### ASSETS

Balance in Bank, December 1, 1939...	\$ 38.48
Bills receivable.....	41.84
	\$ 80.32

### RECEIPTS

Balance in Bank, November 30, 1938	\$ 47.59
Fees—Current.....	708.19
“ —Advance, etc.....	73.25
Separates.....	126.67
Illustrations.....	73.50
Single and back numbers.....	218.96
Miscellaneous.....	279.78
Advance from Reserve.....	85.00
	\$1612.94

### LIABILITIES

NIL—

### EXPENDITURES

Printing and mailing <i>The Canadian Field-Naturalist</i> .....	\$ 881.21
Postage and Stationery.....	50.20
Editor's Honorarium.....	50.00
Separates.....	73.25
Illustrations.....	85.50
Bank discount.....	18.28
Miscellaneous.....	142.33
Repaid to Reserve Fund.....	273.69
Balance in Bank, December 1, 1939 ..	38.48
	\$1612.94

WILMOT LLOYD, Treasurer.

Audited and found correct  
December 1, 1939.

HARRISON F. LEWIS,  
W. H. LANCELEY,  
Auditors.

**STATEMENT—PUBLICATION FUND**  
**NOVEMBER 30, 1939**

ASSETS		LIABILITIES	
Canadian Government Bonds.....	\$900.00	NIL—	
Balance in Bank, November 30, 1939.	169.52		
	<u>\$1069.52</u>		
RECEIPTS		EXPENDITURES	
Balance in Bank, December 5, 1938...	\$166.88	Payment of Bond Int. to Current Account	39.50
Bond Interest.....	39.50	Balance in Bank, December 1, 1939....	169.52
Bank Interest.....	2.64		
	<u>\$209.02</u>		<u>\$209.02</u>

WILMOT LLOYD, Treasurer.

Audited and found correct.  
December 1, 1939.  
HARRISON F. LEWIS,  
W. H. LANCELEY,  
Auditors.

**STATEMENT—RESERVE FUND**  
**NOVEMBER 30, 1939**

ASSETS		LIABILITIES	
Canadian Government Bonds.....	\$1200.00	NIL—	
Balance in Bank, December 1, 1939 ..	310.99		
	<u>\$1510.99</u>		
RECEIPTS		EXPENDITURES	
Balance in Bank, November 30, 1938..	\$ 119.74	Payment of Bond Interest to	
Bond Interest.....	54.00	Current Account.....	\$ 54.00
Bank Interest.....	2.56	Loan to Current Account .....	85.00
Repaid from Current Account.....	273.69	Balance in Bank, December 1, 1939	\$310.99
	<u>\$449.99</u>		<u>\$449.99</u>

EDWARD F. G. WHITE, Chairman,  
Reserve Fund Committee.  
WILMOT LLOYD, Treasurer.

Audited and found correct  
December 1, 1939,  
HARRISON F. LEWIS,  
W. H. LANCELEY,  
Auditors.

## NOTES AND OBSERVATIONS

ADDITIONS TO THE AVIFAUNA OF CHURCHILL, MANITOBA.—Three species of birds, new to the Churchill, Manitoba, territory, listed below, were collected during the summer of 1939 by Mr. Albert Wilk. All specimens were submitted to Mr. P. A. Traverter for examination and deposition in the Canadian National Museum.

AMERICAN COOT (*Fulica a. americana*).—A female with undeveloped ovaries was taken June 14th on a small lake about four miles south of Churchill. No others were seen during the season and it is presumed the individual was an unattached bird that had wandered north beyond its usual habitat.

YELLOW-BELLIED FLYCATCHER (*Empidonax flaviventris*).—One was collected July 15th. in mixed woods near the "Y" about five miles south of Churchill.

CHIPPING SPARROW (*Spizella p. passerina*).—On July 14th, Mr. Wilk collected a singing male in the spruce woods north of the gravel-pit. Its testes were "very much enlarged and it most likely had a mate in the vicinity" Mr. Wilk writes to me.—FRANK L. FARLEY.

THE "MACOUN GROUP" OF NATURALISTS.—Suggestions have been made in council from time to time that the gatherings of naturalists formerly held in the Biological Offices of the National Museum, be revived under the auspices of the Ottawa Field-Naturalists' Club.

Following a resolution made at the first council meeting of the winter, the Director of the Mines and Geology Branch of the Department of Mines and Resources was approached and in due course permission was granted for the use of the Biological Offices of the National Museum, now in the Motor Building, 238 Sparks Street.

The object of such meetings, in accordance with the aims of the Ottawa Field-Naturalists' Club, is to increase knowledge of Natural History by providing those desiring to consider the more technical phases of the subject with an opportunity for discussion.

A meeting was called for November 28th and all Ottawa and Hull members of the club were invited. The meeting was held in the National Herbarium with an attendance of twelve.

It was decided at this meeting to form a loose organization to function as one of the activities of the Ottawa Field-Naturalists' Club and to commemorate the work of that great Canadian naturalist, John Macoun, the name "Macoun Group" was chosen.

It was further decided that informal meetings at which short talks will be given and discussed, will be held on the second Monday of each month. The study of natural history objects will also be a feature.

At the council meeting held on January 3rd, a progress report on the formation of the "Macoun Group" was made. Council concurred and set up a special "Macoun Group" committee with A. E. Porsild as chairman. This committee of council in collaboration with two representatives of the group would deal with programmes and other affairs of the group.

The first regular meeting of the "Macoun Group" was held on January 8th at 8.00 p.m. with an attendance of nineteen. A chairman and a secretary were elected. Following the reading of the minutes the chairman reported the action of council, following which C. H. D. Clarke and H. A. Senn were elected to act with A. E. Porsild as programme committee. A voluntary contribution was made to defray such incidental expenses as postage and stationery. C. Heimbürger then gave a talk entitled "Natural Poplar Hybrids in the Ottawa District".

Persons desiring to attend future meetings of the "Macoun Group" are asked to communicate with A. E. Porsild (2-8211, local 591) in order to have their names placed on the mailing list to receive notices of future meetings. In order to be admitted to the Motor Building after office hours each person wishing to attend should telephone his name to the above number, not later than noon of the day of the meeting, in order that a special pass list may be prepared.—A. E. P.



# Affiliated Societies

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1937-38

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Microscopy		
Zoology	R. A. WARDLE, M.Sc.	
Botany	C. W. LOWE, M.Sc.	
	<i>Secretary:</i> R. HADDOW.	

Meetings are held each Monday evening, except on holidays from October to April, in the physics theatre of the University Winnipeg. Field excursions are held each Saturday afternoon during May, June and September, and on public holiday during July and August.

## VANCOUVER NATURAL HISTORY SOCIETY

OFFICERS FOR 1938-39

*Honorary President:* L. S. KLINK, (LL.D.), *President University of B.C.:* *Past President:* PROF. JOHN DAVIDSON, F.L.S., F.B.S.E., F.R.H.S.; *President:* C. F. CONNOR, M.A., *Vice-President:* MR. J. J. PLOMMER, *Honorary Secretary:* MR. GEO. ROGER WOOD, B.A., *First Assistant Secretary:* MISS VIRGINIA HOLLAND, *2nd Assistant Secretary:* MRS. MARY SIEBURTH, *Honorary Treasurer:* MR. F. J. SANFORD, *Librarian:* MR. A. A. SCOTT, *Additional Members of Executive:* MR. A. H. BAIN, MR. W. CLARK, MRS. H. FARLEY, MR. K. RACEY, MR. P. L. TAIT, DR. E. N. DRIER, MR. E. A. SCHWANTJE; *Chairman of Sections:* *Botany:* PROF. JOHN DAVIDSON, F.L.S., F.B.S.E., F.R.H.S., U.B.C., *Geology:* M. Y. WILLIAMS, PH.D., F.G.S.A., F.R.S.C., U.B.C., *Entomology:* MR. A. R. WOOTTON, *Ornithology:* MR. KENNETH RACEY, *Microscopy:* MR. H. P. CLARK, *Photography:* MR. PHILIP TIMMS, *Mammalogy:* MR. G. L. POP, *Astronomy:* MRS. LAURA ANDERSON, B.A., *Marine Biology:* PROF. G. J. SPENCER, *Auditors:* H. G. SELWOOD, W. B. WOODS.

All meetings at 8 p.m., Auditorium, Normal School, 10th Avenue and Cambie Street unless otherwise announced.

## BRITISH COLUMBIA BIRD AND MAMMAL SOCIETY

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Meetings held the second Monday of the Month except during summer.

*Headquarters of the Society are:*

REDPATH MUSEUM BIRD ROOM,  
MCGILL UNIVERSITY,  
MONTREAL, P.Q.

## SOCIÉTÉ PROVANCHER D'HISTOIRE NATURELLE DU CANADA

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OFFICERS FOR 1938-39.

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Meetings are held at 8 p. m. on the first Monday of each month from October to April at the Royal Ontario Museum, unless otherwise announced. Field trips are held during the spring, and on occasionally during other seasons.

We ask the Officers, and more particularly the Secretaries, of all the Affiliated Societies to assist us in our task of building up the circulation of this periodical. By securing every member as a subscriber we can truly make it one of the leading Natural History publications of America.

For information concerning purchase of the following publications of the Club apply to  
The Treasurer, Ottawa Field-Naturalists' Club,  
582 Mariposa Avenue, Rockcliffe Park, Ottawa, Canada.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes: and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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# The Canadian Field-Naturalist

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No. 2

## THE SUMMER DISTRIBUTION OF THE EASTERN EVENING GROSBEAK

By JAMES L. BAILLIE, JR.<sup>1</sup>



FOR THE purpose of this paper all available reports pertaining to summer occurrences of the Eastern Evening Grosbeak, *Hesperiphona vespertina vespertina*, have been noted and the localities plotted on a map. This work has served to show that the range delineation for this form in the 1931 edition of the American Ornithologists' Union Check-List, although approximately correct, is inadequate.

Quoting from the Check-List, this form is said to "Breed in western Alberta east to northern Michigan and once at Woodstock, Vermont". It will be seen from the accompanying map that in reality it occupies in summer a rather narrow but probably unbroken transcontinental belt along the southern limits of the Canadian Life Zone, from western Alberta to eastern Massachusetts.

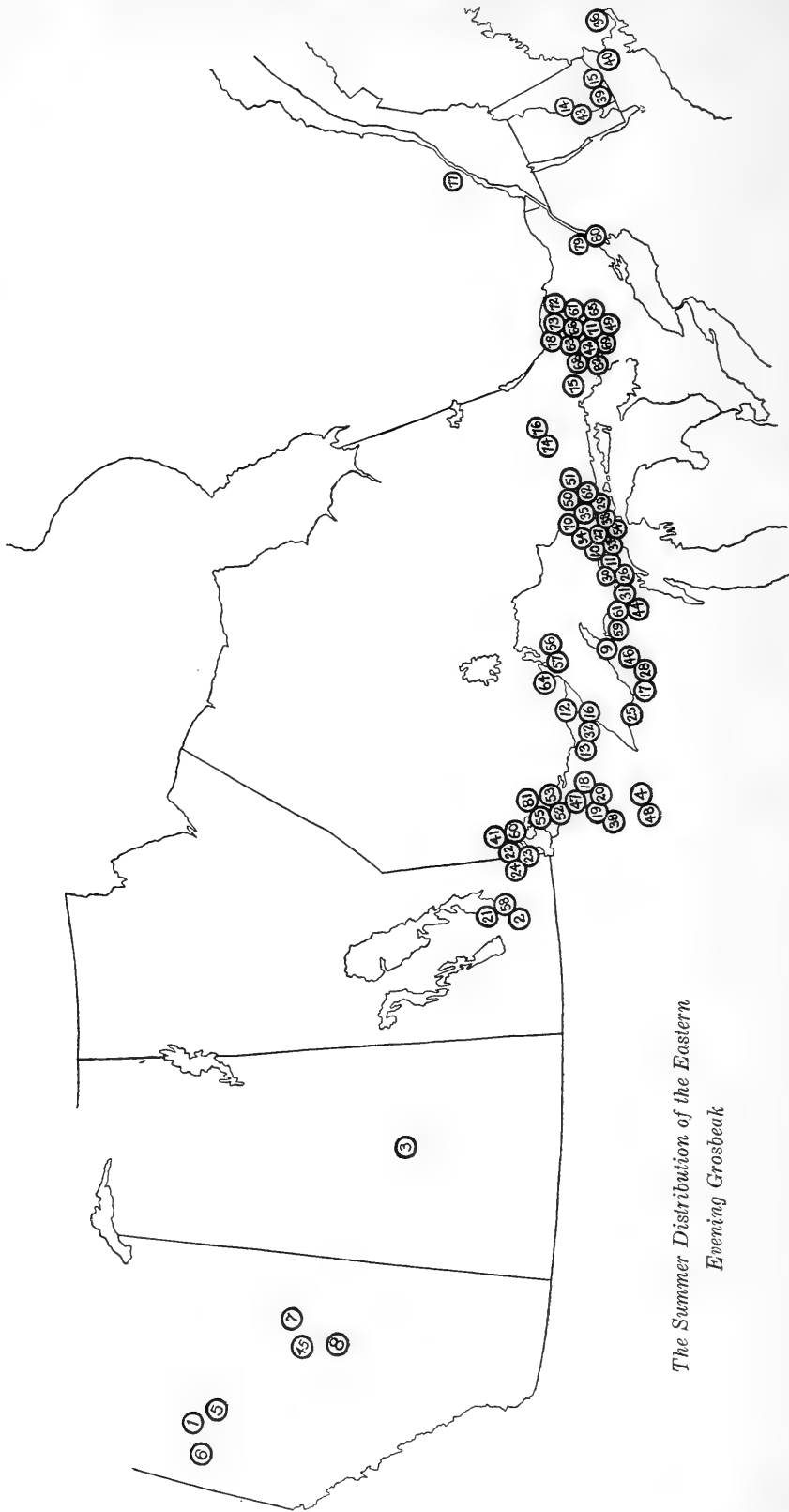
The reports used in the preparation of the map have been compiled into a table. The serial number in the first column of the table is an index to the map. The reports are arranged chronologically, although the first record for each locality is followed immediately by repeat records from that place, if any. The last column is essentially a bibliography of summer occurrences and where no citation is given, the report is here published for the first time.

Almost all of the records listed concern the months of June, July and August. A very few

exceptions have been included, *i.e.* occurrences in late May or early September, in the belief that the birds reported were virtually on their breeding grounds, no evidence having been produced that this form undertakes any extended migration after late May or before early September.

Eighty-two summer stations are listed in the table and marked on the map, from west to east as follows,—Alberta (6), Saskatchewan (1), Manitoba (5), Minnesota (11), Ontario (32), Wisconsin (4), Michigan (17), New York (1), Quebec (1), Vermont (1), New Hampshire (3) and Massachusetts (2). Two of them are border localities (Minnesota-Ontario and Ontario-Manitoba) and consequently are equally applicable to either side of the border. It is an item of interest that 75% of the summer stations have been established since 1920, or during the past two decades. The decade during which there was the most notable range extension was between 1920 and 1929; 47% of all known stations were added to its summer territory. Breeding records (nests or young birds of the year) are listed from 36 places, in all of the states and provinces with the exception of Saskatchewan, Quebec and Massachusetts. In the belt constituting its breeding range, the Evening Grosbeak by no means can be considered a regular summer resident. At some stations (e.g. Sault Ste. Marie) it summers more or less regularly but at other points within the belt, apparently just as suitable to the species, it has not yet been observed in the breeding season, or is rare and uncertain in its appearances. "Its breeding one season is no surety that it will breed there the next or that it bred there the season before" (Taverner, 1921).

<sup>1</sup>Royal Ontario Museum of Zoology.



*The Summer Distribution of the Eastern  
Evening Grosbeak*



Map No.	Locality	Date	Particulars	Reference
1.	Peace River, Alberta	about 1898	Reported nesting	Macoun, W. T., 1899.
2.	Winnipeg, Manitoba	June 18, 1899	4 nests with eggs Reported nesting in 1920	<i>Ottawa Nat.</i> , 13, 195-6. Rowan, Wm., 1920. <i>Auk</i> , 37, 585-6.
3.	Prince Albert, Saskatchewan	May 20, 1900	Noted. Not a summer date but suggestive of a continuous range between Alberta and Manitoba.	Coubeaux, Eug., 1902. <i>Ottawa Nat.</i> , 16, 44-5.
4.	Atikin, Minnesota	July 28, 1900	Flock of five or six Two on Aug. 4, 1903	..... Albert, 1920. <i>Auk</i> , 37, 455.
5.	Lesser Slave Lake to Peace River Landing, Alberta	June, 1903	Two	Macoun, John, 1904.
6.	Dunvegan, Alberta	July 26, 1903	"Pair with young birds just able to fly"	<i>Cat. Can. Birds</i> , Part 3, 416.
7.	Near Athabasca Landing, Alberta	Sept. 4, 1903	Immature male collected	Preble, Edward A. 1908. <i>N.A. Fauna</i> , No. 27: 413.
8.	Thirty miles north-west of Edmonton, Alberta	June, 1908	Quite common, nest with one "dead full-fledged young."	Stansell, Sidney S. S. 1909. <i>Ottawa Nat.</i> , 23:125-7.
9.	Winona, Michigan	about June 12, 1910	In 1909 "rare and breeding"	Stansell, Sidney S. S. 1910. <i>Auk</i> , 27:214-5.
10.	Near Newberry, Michigan	July 16, 1911	One	Seeber, R. R. 1910. <i>Bird-Lore</i> , 12:147-8.
11.	Near McMillan, Michigan	Summer, 1913	Number of adults and "young of the year" Seven on Aug. 18, 1912, two on Aug. 10, 1913 and two on July 14 and 20, 1915 Noted often. From Aug. 13 to 31, 1924, "in numbers". One was killed in early July, 1926.	Beebe, Ralph. 1918. <i>Bird-Lore</i> , 20:291. Beebe, Ralph. 1937. <i>Wilson Bull.</i> , 39:34-6. Byrns, O. M., 1927. <i>Wilson Bull.</i> , 39:40-1. Magee, M. J. 1928. <i>Bull. N.E. Bird-Banding Assoc.</i> , 4:56-9.
12.	Gunflint Lake, Minnesota and Ontario	Summer, about 1913	Reported. Male on July 15, 1917	Lange, D. 1918. <i>Bird-Lore</i> , 20:227.
13.	Near Bald Eagle Lake, Minnesota	Aug. 3-17, 1914	Few adults. One male on July 28 and 30, 1915	Johnson, Charles Eugene. 1920. <i>Auk</i> , 37:541-51.
14.	Near Hanover, New Hampshire	about 1915	Reported nesting	Townsend, Manley B. 1917.
15.	Nashua, New Hampshire	Mid-August, 1916	One	<i>Bird-Lore</i> , 19:204.

Map No.	Locality	Date	Particulars	Reference
16.	Near Cascade Lookcut, Minnesota	Summer, about 1916	Noted. Noted daily in same county from July 7 to 16, 1921, many in same county from June 21 to Aug. 11, 1922, (young after July 25) and pair seen in same county July 26, 1928 Flock of 8 "Parents of two young" Two males Two Several pairs from May 29 to June 1, fairly plentiful July 1 and plentiful Aug. 9, (juvenile collected) "Some numbers" on July 3 and "adult female feeding two young" on Aug. 5 Adult with young "clamouring for food" on July 23 (Ontario side)	Roberts, Thomas S. 1932. <i>Birds of Minn.</i> , 2:347-55.
17.	Near Minoqua, Wisconsin	July 21-23, 1918		Jung, Clarence. 1923. <i>Auk</i> , 40:130-1.
18.	Lake Minnewanka, Minnesota	July 18—Aug. 22, 1919		Cahn, Alvin R. 1920. <i>Wilson Bull.</i> , 32:103-22.
19.	Pinetop, Minnesota	Aug. 1, 1919		Lange, D. 1921.
20.	Popple, Minnesota	Aug. 8, 1919		<i>Bird-Lore</i> , 23:142.
21.	Gimli, Manitoba	May 29—Aug. 9, 1920		Rowan, Wm. 1920. <i>Auk</i> , 37:585-6.
22.	Near Ingolf, Ontario	July 3—Aug. 5, 1920		DeLury, Ralph E. and Justin S. 1922. <i>CanField-Nat.</i> , 36:137.
23.	Indian Bay, Ontario and Manitoba	July 23—Aug. 9, 1920		Rowan, Wm. 1920. <i>Auk</i> , 37:585-6. Ballie, James L., jr. and Paul Harrington. 1937. <i>Trans. Royal Can. Inst.</i> , 21:265.
24.	Falcon Lake, Manitoba	Aug. 6-10, 1920	Two families on July 26 (Manitoba side), one female and two young sexed, the youngest of which "could not have been long out of the nest"	Rowan, Wm. 1920. <i>Auk</i> , 37:585-6.
25.	Washburn to Bayfield, Wisconsin	Mid-Aug., 1920	Flock of four on Aug. 9, at High Lake (Ontario) Six Pair feeding three young "undoubtedly only a short time out of the nest"	Rowan, William. 1922. <i>Auk</i> , 39:224-32. DeLury, Ralph E. and Justin S. 1922. <i>Can. Field-Nat.</i> , 36:137.
				Smith, O. W. 1921. <i>Bird-Lore</i> , 23:86-7.

26.	Munising Junction, Michigan	Summer, 1920	Number. In 1921 six on June 1, and "number of young" on Sept. 4 Male on June 13 and two males on July 15, 1922 Two males on July 24, 1923	<p>Magee, M. J. 1921. <i>Auk</i>, 38:604.</p> <p>Magee, M. J. 1923. <i>Auk</i>, 40:337-8.</p> <p>Magee, M. J. 1924. <i>Auk</i>, 41:159.</p> <p>Magee, M. J. 1921. <i>Auk</i>, 38:604.</p> <p>Magee, M. J. 1923. <i>Auk</i>, 40:337-8.</p> <p>Jung, Clarence. 1923. <i>Auk</i>, 40: 130-1.</p>
27.	Hulbert, Michigan	June—Mid-Aug., 1921	Flock	<p>Magee, M. J. 1921. <i>Auk</i>, 38:604.</p> <p>Magee, M. J. 1929. <i>Bull., N. E. Bird-Banding Assoc.</i>, 5:157-8.</p>
28.	Star Lake, Wisconsin	July 23-25, 1921	Pair on July 15, 1922	<p>Magee, M. J. 1924. <i>Auk</i>, 41:159.</p>
29.	Sault Ste. Marie, Michigan	Aug. 24—Sept. 10, 1921	Flock	<p>Magee, M. J. 1929. <i>Bull., N. E. Bird-Banding Assoc.</i>, 5:157-8.</p>
			Ten or twelve, including young from Aug. 25 ("hardly able to fly") to Sept. 10	<p>Magee, M. J. 1924. <i>Auk</i>, 41:159.</p>
			Few from July 29 to Sept. 9, 1923, including young after Aug. 19	<p>Magee, M. J. 1929. <i>Bull., N. E. Bird-Banding Assoc.</i>, 5:157-8.</p>
			Young noted from Aug. 18 ("very young") to Sept. 13, 1924	<p>Magee, M. J. 1926. <i>Wilson Bull.</i>, 38:170-2.</p>
			Three young on July 29, 1925	<p>Magee, M. J. 1929. <i>Bull., N. E. Bird-Banding Assoc.</i>, 5:157-8.</p>
			Young from July 14 to 30, 1929	
			Young on Aug. 17, 1931	
			Young on July 24, 1932	
			From July 7 to Oct. 8, 1933, 26 immatures were banded, 13 of each sex	<p>Magee, M. J. 1934. <i>Auk</i>, 51:386-8.</p>
			One male	<p>Magee, M. J. 1923. <i>Auk</i>, 40:337-8.</p>
30.	Near Munising, Michigan	June 11, 1922	Six adults and four young on Aug. 19, 1923	<p>Magee, M. J. 1924. <i>Auk</i>, 41:159.</p>

Map No.	Locality	Date	Particulars	Reference
31.	Chatham, Michigan	June 12, 1922	One male	Magee, M. J. 1923. <i>Auk</i> , 40:337-8
32.	Cramer, Minnesota	June 21—Aug. 11, 1922	One male on July 22, 1923	Magee, M. J. 1924. <i>Auk</i> , 41:159
33.	Near Soo Junction, Michigan	July 15, 1922	Many (young from July 25 to Aug. 11) Two males	Roberts, Thomas S. 1932. <i>Birds of Minn.</i> , 2:347-55. Magee, M. J. 1923. <i>Auk</i> , 40:337-8
34.	Whitefish Point, Michigan	July 28-29, 1922	One male on June 16, 1923	Magee, M. J. 1924. <i>Auk</i> , 41:159.
35.	Near Goulais Bay, Ontario	Aug. 4, 1922	Small colony (five nests, two with young "almost ready to leave") Few on June 5, 1930	Ligon, J. Stokley. 1923. <i>Auk</i> , 40:314-6.
36.	Cape Cod, Massachusetts	June 9-23, 1923	One male	Tyrrell, W. Byrant. 1934. <i>Auk</i> , 51:21-6.
37.	Island Lake, Minnesota	June 20—July 6, 1923	Two Number On June 26, 1924 one was captured	Magee, M. J. 1923. <i>Auk</i> , 40:337-8 Forbush, Edward Howe. 1923 <i>Items of Interest</i> , Aug. 1. Roberts, Thos. S. 1923. <i>Bird-Lore</i> , 25:327-8.
38.	Fifteen miles west of Sault Ste. Marie, Michigan	Aug. 12, 1923	One male	Lincoln, Frederick C. 1927. <i>U.S. Dep. Agr., Tech. Bull.</i> , No. 32:48.
39.	Jaffrey, New Hampshire	Mid-Aug.—Sept. 10, 1923	Flock of 4	Magee, M. J. 1928. <i>Bull., N. E. Bird-Banding Assoc.</i> , 4:56-9.
40.	Norfolk and Suffolk Counties, Massachusetts	Sept. 3-9, 1923	Small Flock (Forbush, Edward Howe. 1923. <i>Items of Interest</i> , no. 30, Oct. 1 Male	Magee, M. J. 1924. <i>Auk</i> , 41:159. Tyler, Winsor M. 1923. <i>Bird-Lore</i> , 25:398. Danforth, Stuart T. 1924. <i>Auk</i> , 41:352-3.
41.	Near Minaki, Ontario	Late July, about 1924		Hales, B. J. 1927. <i>Prairie Birds</i> , 223.
42.	Near Bella Lake, Ontario	June—July 5, 1925	In 1937 noted daily from Aug. 15 to 20, adult feeding young on the 16th, at Harbour Island Pair	Cartwright, B. W. 1937. <i>Winnipeg Evening Tribune</i> , Sept. 4. Saunders, W. E. 1929. <i>Can. Field-Nat.</i> , 43:190.

MacLoghlin, Anna E. 1933.  
*Can. Field-Nat.*, 46:68.

Marble, Richard M. 1926.  
*Auk*, 43:549.

Kittridge, Joseph, jr. 1927.  
*Auk*, 44:259.

Taverner, P. A. 1928.  
*Nat. Mus. Can.*, Bull. No. 50:97.

Klotz, Charles D. 1928.  
*Auk*, 45:222.

Roberts, Thomas S. 1932.  
*Birds of Minn.*, 2:347-55.

43.	Woodstock, Vermont	July 12-14, 1926	In 1927 noted from May 29 to June 11 by Mrs. Anna E. MacLoghlin. Mrs. M. R. Hill observed one with twigs in its mouth in mid-May. 20 noted from June to July 17, 1931, including a young bird being fed by parent male about July 1. Reported to Wm. C. Mansell in July, 1933, at Rebecca Lake. Male on July 9, 1934 at Rebecca Lake, by W. C. Mansell. In 1936 several seen on July 21, by Mrs. Hughitt. 4, including immatures, from Aug. 22-28, 1938 by Dr. E. L. Breton. 5 adults from June 16 to Aug. 7 and on latter date three adults with four young birds being fed by parents on Aug. 7, 1939, by Dr. E. L. Breton. Pair with four young "with tails—very short and many downy feathers still—on their heads" Pair Two females collected
44.	Carlsend, Michigan	July 24, 1926	
45.	Belvedere, Alberta	Aug. 30—Sept. 27, 1926	
46.	Near Mamie Lake, Wisconsin	June 6—Aug. 1, 1927	Four adults and seven young "quite unable to make a sustained flight" Six "A possible record" Male seen by C. S. Milne Pair seen by Dr. D. A. MacLulich Noted 30 miles from No. 48, by Dr. D. A. MacLulich
47.	Big Falls, Minnesota	July 28—Aug. 1, 1927	
48.	Brainerd, Minnesota	July, 1927	
49.	Irondale, Ontario	June 8, 1927	
50.	Mississauga Forest Reserve, Ontario	July 13, 1928	
51.	Mississauga Forest Reserve, Ontario	Late July, 1928	

Map No.	Locality	Date	Particulars	Reference
52.	Emo, Ontario	June 1-6, 1929	One to four	Snyder, L. L. 1938. <i>Trans. Royal Can. Inst.</i> , 22:209. Magee, M. J. 1930. <i>Bird-Banding</i> , 1:40-1. Tyrrell, W. Byrant. 1934. <i>Auk</i> , 51:21-6. Snyder, L. L. 1938. <i>Trans. Royal Can. Inst.</i> , 22:209.
53.	Fort Frances, Ontario	June 7, 1929	Flock of 8	
54.	Eckerman, Michigan	June, 1929	Flock of about 70, 32 on June 30	
55.	Off Lake, Ontario	July 6, 1929	Young about 1929 Flock early June, 1930 One	
56.	Tobin's Harbor, Isle Royale, Michigan	Aug. 5, 1929	Adults and juveniles collected	Wood, Norman A. 1930. <i>Auk</i> , 47:267-8.
57.	North side, Isle Royale, Michigan	Aug. 8-23, 1929	Adults and immatures collected	
58.	Selkirk, Manitoba	June 11-17, 1930	Nest commenced on 11th, contained 5 eggs on 17th, when another nest with 4 eggs was observed. Both were photographed	Magee, M. J. 1934. <i>Auk</i> , 51:386-8. Roberts, Thomas S. 1932. <i>Birds of Minn.</i> , 2:347-55. Cartwright, B. W. 1937. <i>Winnipeg Evening Tribune</i> , Sept. 4. Christy, Bayard H. 1930. <i>Wilson Bull.</i> , 42:217-8.
59.	East Baraga County, Michigan	June 19, 1930	2 or 3 pairs and nest in process of being built	
60.	Kenora, Ontario	June 3-Sept. 5, 1931	Noted, with young being fed by parents on Sept. 5, by L. Paterson	Baillie, James L., jr. and Paul Harrington. 1937. <i>Trans. Royal Can. Inst.</i> , 21:265.
61.	McFarland, Michigan	June 12, 1931	Pair collected, the female bearing egg ready to lay in "few days"	
62.	Laird, Ontario	July 23, 1931	Pair collected by L. L. Snyder	MacLulich, D. A. 1938. <i>R.O.M.Z., Contrib.</i> No. 13: 39-40.
63.	Near Brule Lake, Ontario	Summer, 1931	Reported Reported summer 1932 Reported summer 1933 Fairly common June 11 to Aug. 30, 1934, young from late July to Aug. 4. Flock at Rain Lake summer 1934	
64.	Port Arthur, Ontario	June 10, 1932	Noted by Col. L. S. Dear - Brood of young, about a week out of nest, noted on July 29, 1933	Baillie, James L., jr. and Paul Harrington. 1937. <i>Trans. Royal Can. Inst.</i> , 21:265.
65.	Harcourt, Ontario	June 18, 1932	Male	

66.	Near Cache Lake, Ontario	Summer, 1932	Two pairs raised broods Several pairs nested in 1933 "Frequent" Summer of 1935 at Source Lake	MacLulich, D. A. 1938. <i>R.O.M.Z., Contrib. No. 13:</i> 39-40.
67.	Joe Lake, Ontario	Summer, 1933	Noted. More common and young noted in 1934 by J. F. Calvert	
68.	Pickereel Lake, Ontario	July—Aug. 16, 1934	Adults July and Aug. 6; Young with parents from Aug. 7 to 16, five young and 2 adults collected Immature collected Aug. 1, 1936 Sixteen adults and young in same flock on July 26 and others on July 27, 1938, by J. L. Baillie, Jr. Male on July 20, 1939, by Charles Zarobsky Male seen by Hugh M. Hall- iday and J. L. Baillie, Jr. Young attended by parents collected by Dr. C. H. D. Clarke Regular summers of 1935, 1936 and 1937 but scarce in 1938 and 1939, according to E. W. Calvert. Male seen by Allan Twin- ing and Rod Oxford Flock of about 6 seen by Professor J. R. Dymond One to three noted by Clif- ford E. Hope, Stuart C. Downing and J. L. Baillie, jr. Family party seen, adult male and 2 immature males collected. One reported to J. L. Baillie, jr. Two seen by S. C. Downing Several pairs seen by Ken- neth Mayall	
69.	Dorset, Ontario	June 30, 1935		Baillie, James L., jr. and Paul Harrington. 1937. <i>Trans. Royal Can. Inst.</i> , 21:265.
70.	Bachawana Bay, Ontario	Aug., 1935		
71.	Haliburton, Ontario	Summer, 1935		
72.	Grand River, Algonquin Park, Ontario	Mid-June, 1936		Baillie, James L., jr. and Paul Harrington. 1937. <i>Trans. Royal Can. Inst.</i> , 21:265.
73.	Lake Traverse, Ontario	July 12, 1936		
74.	Biscotasing, Ontario	June 23—July 4, 1937		
75.	Bigwood, Ontario	Aug. 2, 1937		Baillie, James L., jr. and Paul Harrington. 1937. <i>Trans. Royal Can. Inst.</i> , 21:265.
76.	Shining Tree, Ontario	Summer, 1937		
77.	Gélinas River, 16 miles north of Shawinigan Falls, Quebec	June 5, 1938		
78.	North of Little Nipissing River, 15 miles west of Cedar Lake, Ontario	June 9, 1939		



Map No.	Locality	Date	Particulars	Reference
79.	Black Rapids, Leeds County, Ontario	July 3, 1939	One seen by F. A. Ferguson, according to G. C. Toner	
80.	Grindstone Island, St. Lawrence River, New York	Aug. 2, 1939	Two or three seen by J. H. Follmer, according to G. C. Toner.	
81	Nestor Falls, Rainy River District, Ontario	Aug. 20, 1939	Four seen by Miss Robertson, according to Mrs. J. M. Speirs.	
82	Wigwagan Lodge, Lake Rosseau, Ontario	Aug. 27, 1939	Male seen by J. Murray Speirs.	

Winter migrations of the Evening Grosbeak to the eastern states and provinces occurred at irregular intervals between 1823 and 1886. They were pronounced and widespread during the winters of 1886-7 and 1889-90. From that time until the present eastward movements of the species in winter have become more and more regular in their nature and there is little doubt that the bird has increased tremendously in the east during the past fifty years.

The more recent and regular occurrences of the species in eastern North America in winter seem to be correlated with an increase of the species in summer and it seems evident that its summer range has been extended eastward by gradual stages during comparatively recent years. Some idea of the progress of this extension may be gathered from the table, wherein it is shown that up to 1899 no summer occurrences had been reported east of southern Manitoba, until 1910 none east of the head of Lake Superior; and until 1915 none east of Sault Ste. Marie, at the eastern end of the same lake. Facilitating their eastward extension has been the widespread planting in the east during the past few decades of the Box Elder (*Acer negundo*) as a shade tree (Allen, 1919). The seeds of the Box Elder, which hang on the trees all winter, are preferred by the Evening Grosbeak to anything else, when available and Taverner (1921) calls the situation a "baited highway" along which the grosbeaks have been able to pass.

The supposition that this race always bred throughout its range as now delineated and that the increase in reports simply denotes increased observation seems untenable. The only records which might support such a theory were those of Cooper (1825), who stated that Major Delafield saw a flock of six on August 23, 1823 in western Ontario; Thompson (1890) who published Richard Hunter's statement that the species was present "all the year round" in southern Manitoba, about 1885, and Coues (1882) who published the fact that a male had been identified by Charles F. Earle at Marcellus, central New York, on July 8, 1882. It seems best to regard these as representing previous unsuccessful attempts on the part of the species to establish itself in the east in summer.

The evidence about which we can be most certain seems to be that during the present century the Eastern Evening Grosbeak has increased noticeably and has progressively extended its breeding range eastward.

ALLEN, GLOVER M. 1919. *Bird Lore*, 21:50.  
 COOPER, WILLIAM. 1825. *Ann. Lyc. Nat. Hist.*,  
 1:219-22.  
 COUES, ELLIOTT. 1882. *Bull. Nuttall Orn. Club*,  
 7:250.

TAVERNER, P. A. 1921. *Can. Field-Nat.*, 35: 42,  
 44.  
 THOMPSON, ERNEST E. 1890. *Proc. U.S. Nat.*  
*Mus.*, 8: 584.

### CHRISTMAS BIRD CENSUSES, 1939

WOLFVILLE, N. S.—December 28, 1939; 9.00 a.m. to 5.00 p.m. Slightly overcast; wind west, light; 1 in. snow; temp. 10° at start. Two observers, part together and part separated, 88 miles by auto, 5 on foot, entirely within Kings County. Black Duck, 78; American Golden-eye, 1; American Merganser\*, 7; Nova Scotia Ruffed Grouse, 2; Wilson's Snipe, 1; Herring Gull, 47; Northern Flicker, 3; Northern (?-Ed.) Hairy Woodpecker, 1; Northern Downy Woodpecker, 1; Northern Horned Lark, 3; Blue Jay, 20; Northern American Raven, 6; Eastern Crow, 117; Black-capped Chickadee, 34; Acadian Chickadee, 6; White-breasted Nuthatch, 1; Eastern Robin, 5; Eastern Golden-crowned Kinglet, 4; Common Starling, 90; Myrtle Warbler, 2; English Sparrow, 33; Canadian Pine Grosbeak, 3; Slate-coloured Junco, 63; Eastern Tree Sparrow, 4; Common Snow Bunting, 3. Total, 25 species, 535 individuals. The Wilson's Snipe was found in a quaking bog which never freezes, being fed by warm springs. It is not uncommon for this species to winter in this area, which is restricted to a few acres.—R. W. TUFTS and RONALD W. SMITH.

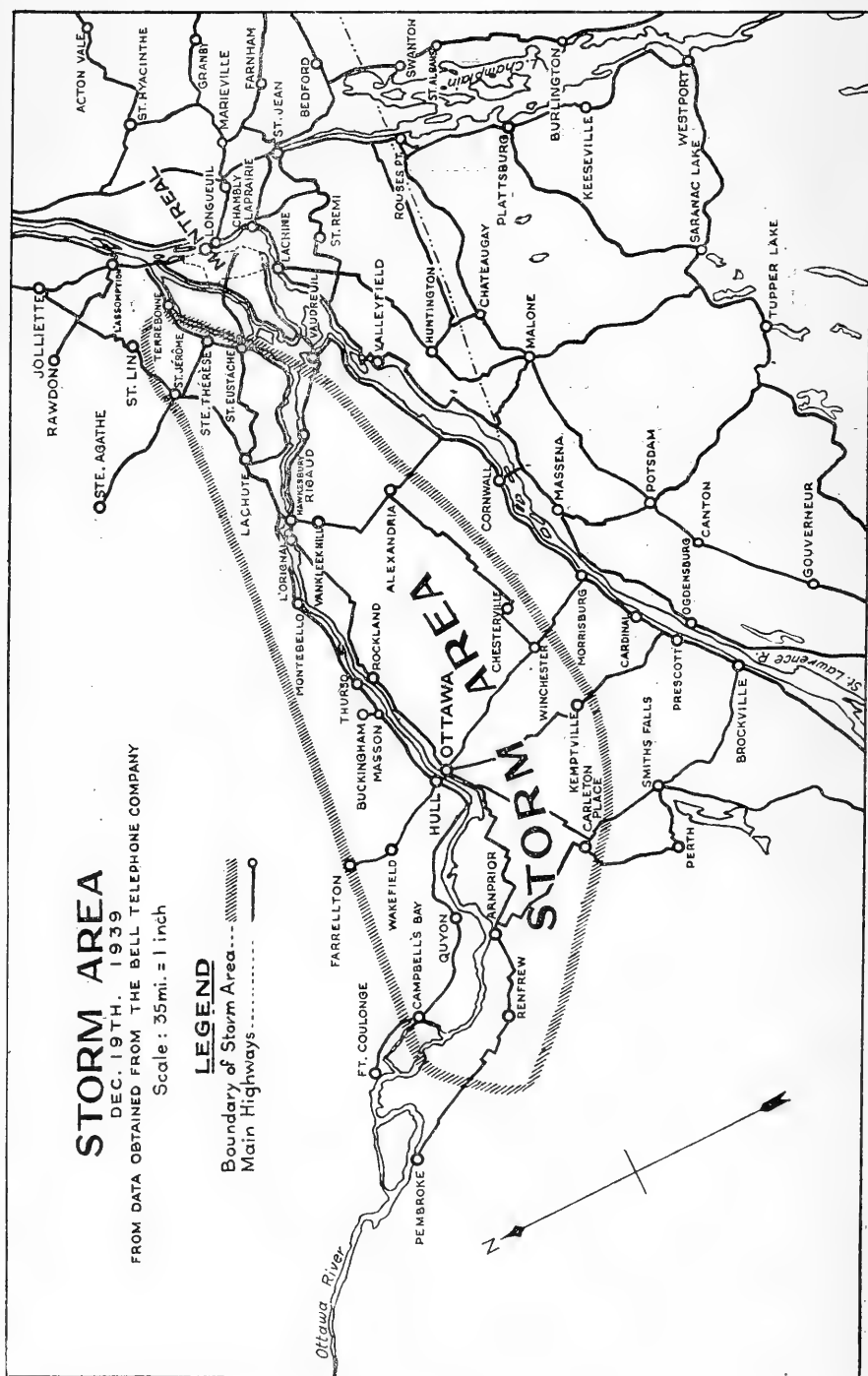
\*This name used by special request of senior author.—Editor.

MONTREAL, QUE.—(Mount Royal and Westmount, Cote St. Luc and La Salle Woods, River St. Lawrence and Nun's Island).—December 24, 1939, 8.30 a.m. to 4.30 p.m. Sky overcast; 6 in. snow, ice-crust on trees; wind 25 m.p.h.; temp. 4° at start, 9° at return. Sixteen observers in 6 groups as follows: party I, 4 observers, 6 hours, 7 miles afoot and 2 by boat; party II, 2 observers, 7 hours, 10 miles; party III, 1 observer, 4½ hours, 7 miles; party IV, 4 observers, 3½ hours, 4 miles; party V, 3 observers, 2½ hours, 3 miles; party VI, 2 observers, 1½ hours, 3 miles. Total miles afoot 34, by boat 2; total hours afoot, 25. American Golden-eye, 22; American Common Merganser, 3; American Rough-legged Hawk, 2; Duck Hawk, 1; Ruffed Grouse, 2; Herring Gull, 13; Barred Owl, 1; Short-eared Owl, 1; Hairy

Woodpecker, 5; Downy Woodpecker, 13; Black-capped Chickadee, 33; White-breasted Nuthatch, 9; Brown Creeper, 4; Northern Shrike, 1; Common Starling, c.250; English Sparrow, c.500; Pine Grosbeak, 55; Common Redpoll, 4; Snow Bunting, c.180. Total, 19 species, about 1099 individuals. An American Screech Owl, 2 Snowy Owls, and some Common Purple Finches were seen recently.—R. S. and P. C. ABBOTT, M. BOWER, J. D. CLEGHORN, J. D. FRY, B. GOLLOP, C. E. HALL, H. A. C. JACKSON, S. MACFARLANE, P. PENFIELD, D. RYAN, D. M. SCOTT, L. M. and E. E. TERRILL, F. R. TERROUX, V. C. WYNNE-EDWARDS (*Province of Quebec Society for the Protection of Birds*).

HUDSON, QUE.—(Hudson, Hudson Heights, and district).—December 24, 1939. Very unfavourable weather for seeing birds; very cold westerly wind, dull, with sunny intervals between 1 and 2.30 p.m. Branches and twigs ice-coated. Temperature from zero to 10°. Four observers; approximately 10 miles covered in an area of perhaps 4 square miles. Ruffed Grouse, 1; Hairy Woodpecker, 5; Downy Woodpecker, 4; Canada Jay, 2; Blue Jay, 7; Black-capped Chickadee, 30; White-breasted Nuthatch, 6; English Sparrow, 2. Total, 8 species, 57 individuals. Common Starling, Pine Grosbeak and Common Redpoll seen recently.—R. L. PUXLEY, G. G. OMMANEY, F. O. PINKNEY, H. H. MULLAN.

OTTAWA, ONT.—December 24, 1939; 7.30 a.m. to 4.10 p.m. Cloudiness 80%, some sunshine; 5 in. snow and ice on ground; wind light, westerly; temp. 1° at 9.00 a.m., 4° at noon. Exposed trees and weeds and most of the bird food they bore were covered with ½ in. to 1 in. of ice, deposited by exceptionally destructive freezing rain on December 19, 1939. Many large and small branches were broken down by the weight of this ice and trees measuring up to 6 in. in diameter were bowed until their tops rested on the ground. The accompanying map, prepared from one furnished by the Ottawa office of the Bell Telephone



Company of Canada, shows the area in which this storm was so severe that telephone lines were damaged and required repairs. The area in which bird food was covered with some ice extended for some distance outside the boundary shown on the map. Useful information concerning the extent of this ice formation was also supplied by Colonial Coach Lines, Limited.

Census observers in groups as follows: Party I, 2 observers, 8½ hours, 8 miles; Party II, 1 observer, 2¼ hours, 6 miles; Party III, 2 observers, 4½ hours, 10 miles; Party IV, 4 observers, 3 hours, 1 mile; Party V, 1 observer, 4¾ hours, 7 miles; Party VI, 3 observers, 5 hours, 7 miles; Party VII, 2 observers, 7¼ hours, 8 miles. Total miles afoot, 47; total hours, 35¼. American Golden-eye, 60; Ruffed Grouse, 9; Common Pheasant, 1; Rock Dove, 51; Hairy Woodpecker, 2; Downy Woodpecker, 4; Blue Jay, 1; American Crow, 3; Black-capped Chickadee, 51; White-breasted Nuthatch, 9; Northern Shrike, 1; Common Starling, 226; English Sparrow, 784; Pine Grosbeak, 33; American Goldfinch, 30; Snow Bunting, 15. Total, 16 species, 1280 individuals. Total native birds, only 12 species, 218 individuals. American Common Merganser, 2; Pigeon Hawk, 2; and Song Sparrow, 1, were seen on December 23rd; Barred Owl, 1, on December 25th.—*Ottawa Field-Naturalists' Club.*

Observers: R. M. ANDERSON, D. B. DELURY, R. E. DELURY, B. A. FAUVEL, G. H. HAMMOND, T. S. HENNESSEY, W. H. LANCELEY, B. McL. LEWIS, C. R. LEWIS, HARRISON F. LEWIS, HOYES LLOYD, DOUGLAS LOUGHEED, A. E. PORSILD, STANLEY STERNBERG, THOS. STEWART.

PAKENHAM, LANARK CO., ONT.—December 26, 1939; 8.00 a.m. to 12.00 m. and 1.30 p.m. to 4.30 p.m. Dull sky, turning to bright sunshine about 10.00 a.m.; wind west, fresh; 3 in. dry snow over ice; temp. 11° at start, 9° at finish. Observers separate. One walked 7 mi., one walked 6 mi., the third travelled 25 mi. by horse and cutter and walked 2 mi. Very difficult to hear owing to crackling branches. Canada Ruffed Grouse, 6; Eastern Hairy Woodpecker, 7; Blue Jay, 9; Black-capped Chickadee, 13; White-breasted Nuthatch, 2; Eastern Brown Creeper, 1; Eastern Golden-crowned Kinglet, 2; Common Starling, 25; English Sparrow, 92; Eastern Evening Grosbeak, 44; Pine Siskin, 8. Total, 11 species, 209 individuals. The severe ice-storm of a week ago has evidently affected the bird population. Ice is still thick on the trees and food hard to secure.—EDNA G. ROSS, ALLAN F. ROSS, WILMER ROSS.

ARNPRIOR, ONT.—December 24, 1939, 10.00 a.m. to 4.30 p.m. Fair; 6 in. snow; moderate n.w. wind; temp. 1° below zero at start, 9° at return. Sixteen miles on foot. Observers separate. Canada Ruffed Grouse, 6; Eastern Hairy Woodpecker, 4; Northern Downy Woodpecker, 4; Blue Jay, 4; Eastern Crow, 1; Black-capped Chickadee, 25; White-breasted Nuthatch, 8; Red-breasted Nuthatch, 2; Common Starling, 6; English Sparrow, 1 plus; Eastern Evening Grosbeak, 36; Pine Grosbeak, 10; American Goldfinch, 2; White-winged Crossbill, 4; Snow Bunting, 5. Total 15 species, 118 plus individuals. Seen recently, 1 Northern Pileated Woodpecker, 1 Northern Shrike, 2,000 Snow Buntings. Subspecies determined geographically.—LIGUORI GORMLEY and CHARLES MACNAMARA.

TORONTO, ONT.—December 24, 1939; 8.00 a.m. to 5.00 p.m. Clear sky until noon, mostly cloudy in afternoon; light northwest wind; about ½ inch of snow; temp. max. 28°, min. 7°. Fifty-five observers in eight parties. Pintail, 4; Greater Scaup Duck, 2,555; American Golden-eye, 168; Buffle-head, 22; Old-squaw, 703; King Eider, 1; White-winged Scoter, 1; American Common Merganser, 70; Sharp-shinned Hawk, 1; Cooper's Hawk, 1; Eastern Red-tailed Hawk, 2; Eastern Sparrow Hawk, 4; Ruffed Grouse, 4; Common Ring-necked Pheasant, 118; Common Gallinule, 1; American Woodcock, 1; Great Black-backed Gull, 11; Herring Gull, 3,330; Ring-billed Gull, 1; Eastern Screech Owl, 4; Great Horned Owl, 9; Barred Owl, 2; Eastern Belted Kingfisher, 5; Pileated Woodpecker, 1; Red-headed Woodpecker, 1; Eastern Hairy Woodpecker, 11; Northern Downy Woodpecker, 34; Arctic Three-toed Woodpecker, 1; Horned Lark, 2; Blue Jay, 31; Eastern Crow, 6; Black-capped Chickadee, 258; White-breasted Nuthatch, 41; Red-breasted Nuthatch, 7; Brown Creeper, 11; Hermit Thrush, 1; Eastern Golden-crowned Kinglet, 25; Eastern Ruby-crowned Kinglet, 1; Northern Shrike, 1; Common Starling, 926; English Sparrow, 2,092; Eastern Redwing, 1; Eastern Cardinal, 18; Evening Grosbeak, 4; Eastern Purple Finch, 5; Pine Grosbeak, 54; Redpoll Linn. 30; Pine Siskin, 54; American Goldfinch, 33; White-winged Crossbill, 28; Slate-coloured Junco, 119; Tree Sparrow, 315; Swamp Sparrow, 1; Song Sparrow, 26; Lapland Longspur, 750. Total, 55 species, 11,906 individuals.

The Woodcock and Hermit Thrush appear for the first time and make a total of 97 species seen

on the fifteen Christmas censuses taken since 1925.

THE BRODIE CLUB,

per R. J. RUTTER, *Secretary*.

*Observers:* J. L. BAILLIE, F. BANFIELD, D. BEACHAM, G. BEARE, G. S. BELL, R. E. BENNETT, A. BOISSONNEAU, E. BOISSONNEAU, C. E. BOND, R. BREMNER, H. H. BROWN, F. COOK, E. CROSSLAND, G. CUMMINGS, F. S. DINGMAN, R. G. DINGMAN, I. ELLIS, F. H. EMERY, D. FORBES, W. GUNN, P. HARRINGTON, C. E. HOPE, M. JARRETT, G. LAMBERT, A. LAWRIE, J. LINK, D. MACLULICH, W. MANSELL, D. MILLER, C. MOLONY, F. MOWAT, T. MURRAY, L. OWENS, L. A. PRINCE, R. PYLE, G. H. RICHARDSON, R. RUSSELL, R. J. RUTTER, J. SATTERLY, C. SAUNDERS, R. SAUNDERS, D. SCOVILLE, A. SHORTT, T. M. SHORTT, R. A. SMITH, L. L. SNYDER, H. H. SOUTHAM, D. H. SPEIRS, J. M. SPEIRS, G. STEVENS, T. SWIFT, S. L. THOMPSON, D. WEST, H. WOOTTON, R. B. WOOTTON.

HAMILTON, ONT. (Dundas Valley west to Ancaster, Hamilton and Harbour, Aldershot, Watdown, Lake Medad, Burlington, Bronte).—December 17, 1939; 7.30 a.m. to 5.30 p.m. Overcast; ground bare, harbour open; wind moderate southwest to northwest; temp. 38° to 44°. Observers in groups as follows: Party I, 1 observer, 8 hours, 25 miles; party II, 4 observers, 8 hours, 10 miles; party III, 3 observers, 7 hours, 10 miles; party IV, 2 observers, 8 hours, 12 miles; party V, 5 observers, 2 hours, 4 miles; party VI, 1 observer, 9 hours, 14 miles; party VII, 2 observers, 9 hours, 25 miles; party VIII, 1 observer, 6 hours, 11 miles; party IX, 3 observers, 3 hours, 8 miles; party X, 2 observers, 8 hours, 9 miles; party XI, 2 observers, 9 hours, 20 miles; party XII, 1 observer, 4 hours, 3 miles; 4 observers at separate feeding-stations. Total miles afoot, 151; total hours afoot, 81. Common Loon, 1; Horned Grebe, 2; Great Blue Heron, 3; Mallard Duck, 23; Black Duck, 241; Green-winged Teal, 1; Redhead, 4; Canvas-back, 3; Greater Scaup Duck, 500; Lesser Scaup Duck, 14; American Golden-eye, 134; Buffle-head, 1; Old-squaw, 2; White-winged Scoter, 20; Hooded Merganser, 49; American Common Merganser, 210; Red-breasted Merganser, 53; American Goshawk, 2; Cooper's Hawk, 2; Red-tailed Hawk, 3; American Rough-legged Hawk, 1; Marsh Hawk, 1; American Sparrow Hawk, 3; Ruffed Grouse, 40; Pheasant (sp. ?), 90; Killdeer Plover, 1; Great Black-backed Gull, 65; Herring Gull, 5,500; Ring-billed Gull, 350; Bonaparte's Gull, 1,000; Little Gull, 1 (G.W.N.); American Screech Owl, 3; Great Horned Owl, 8; American Long-eared

Owl, 3; Belted Kingfisher, 1; Flicker (sp. ?), 2; Pileated Woodpecker, 1; Hairy Woodpecker, 17; Downy Woodpecker, 48; Blue Jay, 82; American Crow, 2; Black-capped Chickadee, 315; White-breasted Nuthatch, 60; Red-breasted Nuthatch, 4; Brown Creeper, 5; American Robin, 1; Golden-crowned Kinglet, 12; Cedar Waxwing, 31; Common Starling, 451; English Sparrow, 987; Meadowlark (sp. ?), 1; Cardinal, 14; Purple Finch (sp. ?), 21; Common Redpoll, 1; American Goldfinch, 12; White-winged Crossbill, 15; Slate-coloured Junco, 180; Tree Sparrow, 322; Swamp Sparrow, 4; Song Sparrow, 7. Total, 60 species; 10,930 individuals. Ring-necked Duck, King Eider, Gray Partridge, Glaucous Gull, Northern Shrike, Pine Grosbeak, and Snow Bunting seen recently.—DON, NEIL and R. D. F. BOURNE, F. H. BUTCHER, MRS. J. G. FARMER, MISS M. E. GRAHAM, H. E. KETTLE, MISSES J. MAGEE, E. MALCOLM, R. MILLS, MRS. J. P. MORTON, MRS. F. E. McLOUGHLIN, DR. and MRS. G. O. McMILLAN, G. W. NORTH, R. NORTH, KEITH REYNOLDS, MISS L. STEWART, J. H. WILLIAMS (*Hamilton Bird Protection Society, Inc.*), JACK and BILL CAMPBELL, BOB ELSTONE, KEN HANNIGAN, DON HASSELL, JACK MARTIN, DOUGLAS MCCALLUM, LEONARD POLLARD, WILLARD RANDALL, KEN REIGER, BLAIR RONALD, FRED SMITH, BOB WHITE (*Hamilton Outdoor Naturalists*).

VINELAND, ONT. (Lake shore, the Experimental Station, Jordan Pond).—December 25, 1939; 10.00 a.m. to 1.00 p.m. Cloudy; wind northwest, strong; temp. 36°; no snow on ground. American Golden-eye, 7; American Common Merganser, 1; Sharp-shinned Hawk, 1; Cooper's Hawk, 1; Common Pheasant, 2; Herring Gull, 6; Ring-billed Gull, 1; Mourning Dove, 1; Black-capped Chickadee, 4; White-breasted Nuthatch, 1; Brown Creeper, 1; Golden-crowned Kinglet, 8; House Sparrow, 38; Cardinal, 1; Slate-coloured Junco, 26; Tree Sparrow, 15. Total, 16 species, 114 individuals.—DR. W. E. HURLBURT, C. I. CLOUT, D. A. ROSS.

KITCHENER AND WATERLOO, ONT. (Victoria Park, Forest Hill Gardens, German Mills, Cressman's Park, Bridgeport Dam, and junction of Grand River and Natchez Road).—December 29, 1939; 9.00 a.m. to 5.00 p.m. Sky overcast all day; wind southwesterly, light to moderate; temp. 20° to 25°; 3 in. snow on ground, and occasional light snowfalls. Two automobile-parties and several foot parties, including 15 observers. Cooper's Hawk, 1 (G. W. Knechtel); Ruffed Grouse, 2;

Common Pheasant, 5; Herring Gull, 2; Hairy Woodpecker, 3; Downy Woodpecker, 5; Blue Jay, 2; Black-capped Chickadee, 25±; White-breasted Nuthatch, 1; Red-breasted Nuthatch, 1 (F.W.R.D.); American Robin, 1; Golden-crowned Kinglet, 5+; Common Starling, 50+; English Sparrow, 140+; Slate-coloured Junco, 60±; Tree Sparrow, 20+; Song Sparrow, 2. Total, 17 species, 325+ individuals. Found within the past few weeks: American Bittern, American Screech Owl, Great Horned Owl, Snowy Owl, Belted Kingfisher, Cardinal, Purple Finch (sp. ?), Lapland Longspur, and Snow Bunting.—E. L. JAMES, *Secretary*, Kitchener-Waterloo Naturalists' Club.

LONDON, ONT. (Vicinity).—December 23, 1939. Sky overcast; ground partially covered with snow; wind light, east to southeast; temp. at 8.00 a.m. 28°, remaining fairly constant throughout the day but falling somewhat toward evening. Sixteen observers in nine parties, in the field mostly in the morning only, covering about thirty-seven miles on foot and thirty by automobile. Great Blue Heron, 1; Black Duck, 2; American Golden-eye, 49; American Common Merganser, 85; Red-tailed Hawk, 2; Bald Eagle, 2; Ruffed Grouse, 2; Bob-white, 8 (one covey); Common Pheasant, 11; Herring Gull, 58; Ring-billed Gull, 1; American Screech Owl, 2; Great Horned Owl, 4; Belted Kingfisher, 6; Yellow-bellied Sapsucker, 1; Hairy Woodpecker, 7; Downy Woodpecker, 26; Blue Jay, 42; American Crow, 305; Black-capped Chickadee, 159; White-breasted Nuthatch, 25; Brown Creeper, 7; Winter Wren, 2; Carolina Wren, 2; Golden-crowned Kinglet, 64; Starling, 75; English Sparrow, numbers not counted; Red-winged Blackbird, 1; Cardinal, 97; Common Purple Finch, 18; Redpoll (sp. ?), 1; Pine Siskin, 8; American Goldfinch, 9; Slate-coloured Junco, 77; Tree Sparrow, 34; Swamp Sparrow, 2; Song Sparrow, 4; Lapland Longspur, small flock heard, probably about 4 individuals. Total, 38 species, 1,203 individuals. Seen within the week; Pied-billed Grebe, 1; American Rough-legged Hawk, 1; Mourning Dove, 4; Snowy Owl, 1; Northern Shrike, 1; Meadowlark (sp. ?), 2.—RAE BROWN, E. M. S. DALE, ELI DAVIS, KAY FETHERSTON, W. G. GIRLING, E. HARPUR, R. HEDLEY, FRANCES JACOBS, W. JARMAIN, DR. W. E. SAUNDERS, RODGER STANDFIELD, JUNE STITCHBURY, W. D. SUTTON, MRS. THEODIE, KEITH REYNOLDS. (*McIlraith Ornithological Club*).

CHATHAM, ONT.—December 21, 1939; 8.00 a.m. to 5.00 p.m. Sky overcast; wind northwest, strong; temp. 25° at start, 27° at noon and at finish; patches of snow on ground, slight snow flurries throughout the day. Two separate parties and one individual. First party, Erieau, Rondeau Park, woods in Thames River Valley, 7 mi. east of Chatham, and "old nursery", 1½ mi. south of Chatham. Second party, Bradley's marsh beside Lake St. Clair, woods in Sydenham River Valley, 1 mi. east of Dresden, woods in Thames River Valley, 7 mi. east of Chatham, and the English farm, 1½ mi. south of Chatham. One individual made early morning observations at Ridgetown. Horned Grebe, 7; Mallard Duck, 2; Black Duck, 210; Greater Scaup Duck, 1; Lesser Scaup Duck, 17; American Golden-eye, 4; American Common Merganser, 3; Red-breasted Merganser, 2; Ducks in large flocks, too far out on water to be identified specifically, 1040+; Sharp-shinned Hawk, 2; Cooper's Hawk, 3; Red-tailed Hawk, 5; Red-shouldered Hawk, 3; American Rough-legged Hawk, 3; Golden Eagle, 1 (satisfactorily observed through ×8 binoculars at 100 yards); Bald Eagle, 4; Marsh Hawk, 3; Bob-white, 8; Common Pheasant, 4; Herring Gull, 200+; Ring-billed Gull, 1; Bonaparte's Gull, 1000+; Rock Dove, 30; Mourning Dove, 28; American Screech Owl, 1; Great Horned Owl, 1; American Long-eared Owl, 1; Flicker (sp. ?), 1; Hairy Woodpecker, 3; Downy Woodpecker, 6; Prairie Horned Lark, 85+; Blue Jay, 18; American Crow, 250+; Black-capped Chickadee, 25; White-breasted Nuthatch, 11; Brown Creeper, 4; Golden-crowned Kinglet, 11; Northern Shrike, 1; Common Starling, 400+; English Sparrow, 770+; Bronzed Grackle, 8; Cardinal, 20; American Goldfinch, 1; Junco (sp. ?), 69; Tree Sparrow, 130; Song Sparrow, 3; Lapland Longspur, 26. Total, 46 species, about 4426 individuals. Whistling Swan, 11, and American Robin, 1, were seen recently in the area.—D. A. ARNOTT, GEOFFREY BEALL, GEO. M. STIRRETT, A. A. WOOD, H. B. WRESSELL (*Kent Nature Club*), and FRED JORDAN and W. J. MCNAUGHTON.

MEAFORD, ONT. (Walter's Falls and the shore line for 2 mi. east from Meaford).—December 26, 1939. Bright and cold; wind, north, strong. Fourteen observers in two parties. Horned Grebe, 2; American Golden-eye, 3; American Common Merganser, 45; Red-breasted Merganser, 2; Cooper's Hawk, 1; Ruffed Grouse, 3; Herring Gull, 138; Ring-billed Gull, 3; Great Horned Owl, 1; Flicker (sp. ?), 2; Hairy Woodpecker, 2; Downy Wood-

pecker, 2; Blue Jay, 4; Black-capped Chickadee, 33; White-breasted Nuthatch, 2; Common Starling, 57; House Sparrow, 215; Cardinal, 3 (2 males, 1 female); Purple Finch (sp. ?), 6; Pine Grosbeak, 32; Pine Siskin, 3. Total, 21 species, 559 individuals.—*Meaford Natural History Club*, per L. H. BEAMER.

FORT WILLIAM-PORT ARTHUR, ONT. (Lower Kaministiquia Valley and area west of Fort William and Port Arthur).—December 27, 1939; 9.30 a.m. to 4.00 p.m. Sunny until 10.30 a.m., remainder of day overcast, threatening snow; temp. 18° to 24°; ground bare or with slight trace of snow. Continued mild weather and lack of snow unprecedented in this locality. Seven observers in two parties; 36 miles by auto, 8 miles on foot. Ruffed Grouse, 1; Iceland Gull, 1; Herring Gull, 232; Hawk Owl, 2; Pileated Woodpecker, 2; Hairy Woodpecker, 4; Downy Woodpecker, 1; Canada Jay, 3; Blue Jay, 5; American Crow, 25; Black-capped Chickadee, 3; Bohemian Waxwing, 63; Common Starling, 22; English Sparrow, 150; Pine Grosbeak, 10; Common Redpoll, 54. Total, 16 species, 578 individuals. The Gulls and Crows were frequenting a large fur farm. Evening Grosbeaks, 6, and Red Crossbills, 2, have been seen during the past three days.—*Thunder Bay Field Naturalists' Club*.

Observers: A. E. ALLIN, D. BECKETT, G. K. EOLL, C. E. GARTON, J. S. LOWCOCK, MISS S. PACE, MISS E. THOMAS.

CAMROSE, ALTA. (spruce woods and marshes along Battle River, 6 mi. south of Camrose).—December 23, 1939, 1.00 p.m. to 4.00 p.m. Clear, no wind, 1 in. snow, temp. 20°. The winter, to and including census day, is believed to be the mildest experienced in this locality in 48 years. Observers together. Ruffed Grouse, 3; Downy Woodpecker, 1; Blue Jay, 1; Magpie, 4; Black-capped Chickadee, 3; Brown Creeper, 1; Pine Grosbeak, 10; Common Redpoll, 10; Snow Bunting, 1. Total, 9 species, 34 individuals.—FRANK L. FARLEY and RAYMOND ST. PIERRE.

COURTENAY AND COMOX, VANCOUVER ISLAND, B.C. (outskirts of Courtenay, river bank, cultivated area behind, to mouth of river; sea-shore and wooded area nearby).—December 23, 1939; 9.00 a.m. to 4.00 p.m. Sunny most of day, wind negligible, temp. 37° to 42°. Observers together

on foot. Total mileage approximately 7 mi. Common Loon, 19; Pacific Loon, 3+; Holboell's Grebe, 2; Horned Grebe, 4; Western Grebe, 1000+; Pied-billed Grebe, 1; White-crested Cormorant, 2; Northwest Coast Heron, 2; Mallard Duck, 150+; Baldpate, 30+; Canvas-back, 5; Scaup Ducks (only the Greater Scaup Duck actually identified), 350+; American Golden-eye, 100+; Barrow's Golden-eye, 6; Buffle-head, 30+; White-winged Scoter, 1500+; Surf Scoter, 1500+; American Scoter, 5+; Hooded Merganser, 2; American Common Merganser, 19; Red-breasted Merganser, 5; Bald Eagle, 1; California Quail, 5; Common Pheasant, 1; American Coot, 34; Glaucous-winged Gull, 450+; Thayer's Gull, 1; Short-billed Gull, 20; Pigeon Guillemot, 1; Belted Kingfisher, 6; Flicker, (sp. ?), 12; Pileated Woodpecker, 2; Harris's Woodpecker, 4; Steller's Jay, 2; Northwestern Crow, 40; Chestnut-backed Chickadee, 13; Red-breasted Nuthatch, 2; Winter Wren, 13; Seattle Wren, 1; American Robin, 1; Varied Thrush, 3; Golden-crowned Kinglet, 14; Northern Shrike, 1; Audubon's Warbler, 1; English Sparrow, 9; Meadowlark (sp. ?), 9; Brewer's Blackbird, 35+; California Purple Finch, 63; Crossbill (sp. ?), 3; Oregon Towhee, 7; Oregon Junco, 35+; Song Sparrow, 20. Total, 52 species, 5544+ individuals. December 24th, Pine Siskin, 150.—A. R. DAVIDSON, THEOD PEARSE.

CRESCENT, B.C. (logged-off area and coastline between Ocean Park and Crescent).—December 28, 1939; 9.00 a.m. to 4.00 p.m. Dull; wind north-west, light; temp. 38° to 40°. Three observers on foot. Common Loon, 5; Holboell's Grebe, 3; Horned Grebe, 22; Baird's (?) Cormorant, 2; Northwest Coast Heron, 3; Black Brant, 40; Pintail (?), 2; Greater Scaup Duck, 12; American Golden-eye, 7; Buffle-head, 6; White-winged Scoter, 50+; Surf Scoter, 20+; Red-breasted Merganser, 4; Bald Eagle, 1; Oregon Ruffed Grouse, 2; Common Pheasant, 4; Glaucous-winged Gull, 20; Herring (?) Gull, 1; Western Pileated Woodpecker, 1; Gairdner's Woodpecker, 2; Oregon Chickadee, 5; Western Winter Wren, 4; Bewick's Wren, 2; Varied Thrush, 9; Golden-crowned Kinglet, 20+; Willow Goldfinch, 40; Oregon Towhee, 6; Oregon Junco, 40+; Sooty (?) Fox Sparrow, 1; Rusty Song Sparrow, 5. Total, 30 species, 339+ individuals. Large flocks of Short-billed Gulls, feeding on flooded land in Lower Fraser Valley, return to Boundary Bay at nightfall.—MARTIN W. HOLDOM, MARY W. HOLDOM, FRANCES E. L. HOLDOM.



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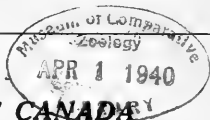
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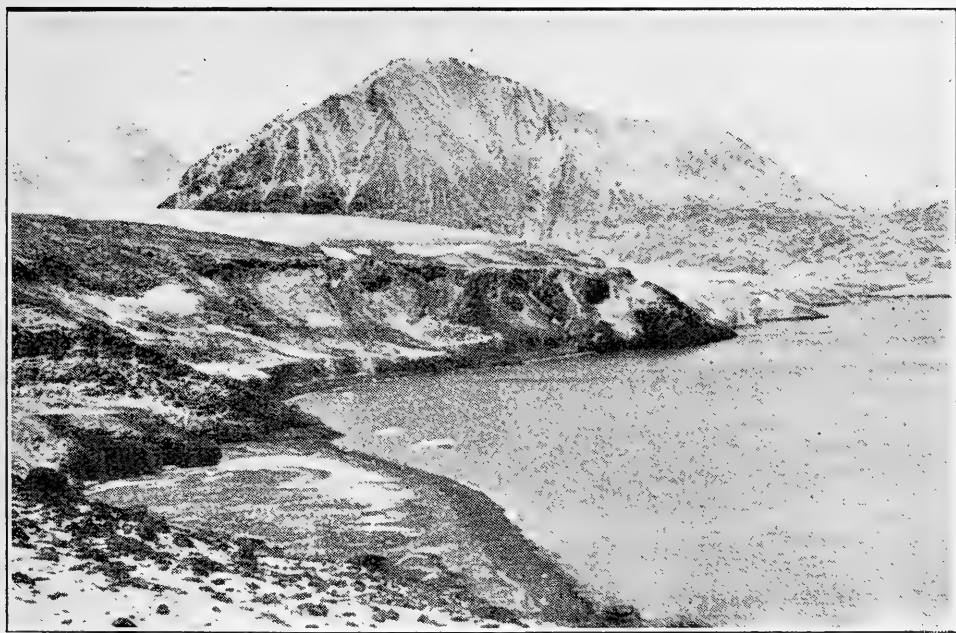
## THE FLORA OF DEVON ISLAND IN ARCTIC CANADA

By NICHOLAS POLUNIN

**D**EVON ISLAND, previously called North Devon, although one of the largest units of the American Arctic Archipelago, still remains among the least known botanically. It extends from lat.  $74^{\circ} 30'N$ . to lat.  $77^{\circ} 5'N$ ., and from long.  $79^{\circ} 30'W$ . to long.  $97^{\circ}W$ . (Simmons 1913, p. 34), having an estimated area of 20,484 sq. miles (Bethune 1935, p. 16). The coast is extremely rugged, consisting generally of tall cliffs or steep slopes interrupted by glaciers which in most cases come right down to the sea

(Phot. 1). The hinterland, except in the west, is lofty and almost entirely occupied by ice-cap; but although only a small portion of the total area is free from ice, there is to be found a considerable variety of plant habitats, including in some sheltered valleys large tracts of closed heathy or marshy vegetation.

The first few plants known to have been collected on Devon Island were brought back in 1825 by Parry's third expedition (cf. W. J. Hooker 1826), while more substantial contributions were



*South coast of Devon Island looking eastwards across a bay near Dundas Harbour. A glacier is seen coming from the ice-cap (upper left-hand corner) and discharging into the sea. A sprinkling of new snow lies on the otherwise dark foreground—  
September 14th, 1934.*

made by members of various Franklin searching expeditions in the 1850's (cf. J. D. Hooker 1857 and 1861), and in 1900-02 by the Second Norwegian Arctic Expedition in the "Fram" (cf. Simmons 1909) <sup>1</sup>.

Subsequently a whole series of Canadian Government expeditions made brief calls (generally at Dundas Harbour on the south coast) which allowed the making of further useful collections. Altogether the following 16 explorers, sailors or scientists have collected vascular plants on Devon Island, although in most cases so casually that in a total of about 24 hours spent at one point (Dundas Harbour) in 1934 and 1936 I was able to find no less than 14 species not previously known from the island:

- J. C. Ross, 1824.
- W. E. Parry, 1824-5, (cf. W. J. Hooker, 1826).
- F. L. McClintock, 1850-4, (cf. Markham, 1909).
- R. McCormick, 1852, (cf. McCormick, 1884).
- T. C. Pullen, 1852.
- D. Lyall, 1852-4, (cf. J. D. Hooker, 1857).
- Dr. Walker, 1857, (cf. J. D. Hooker, 1861).
- A. C. Horner, 1876<sup>2</sup>.
- P. Schei, 1900-01, (cf. Simmons, 1909).
- H. G. Simmons, 1900-02, (cf. Simmons, 1909 and 1913).
- L. E. Borden, 1904, (cf. Macoun, 1906).
- J. G. MacMillan, 1908.
- J. D. Soper, 1923.
- M. O. Malte, 1927.
- R. M. Anderson, 1928.
- N. Polunin, 1934-6.

The total number of species (not to mention subsidiary forms) of vascular plants which can now be recorded as occurring on Devon Island or its accompanying islets (excluding the rather large North Kent, Coburg, and Philpot Islands) is 104, but there can be no doubt that many more will be added with further exploration. In the following list the species are delimited and arranged as in my forthcoming "Botany of the

Canadian Eastern Arctic, Part 1" <sup>3</sup>, the symbols placed in brackets (following the name of the collector, and date of collection) indicating the herbaria in which I have seen and checked the specimens, <sup>4</sup> viz.

- O Ottawa—National Herbarium of Canada.
- G Gray Herbarium of Harvard University, Cambridge, Mass.
- N New York—Herbarium of the Botanical Gardens.
- K Kew—Herbarium of the Royal Botanic Gardens, London.
- B British Museum of Natural History, London.
- C Copenhagen Botanical Museum.
- S Stockholm—Herbarium of the State Museum.

My own specimens collected in 1934 and 1936 are mostly to be seen in one or another of the four institutions with which I have latterly been most closely connected, viz., the Gray Herbarium of Harvard University at Cambridge, Mass., the National Herbarium of Canada at Ottawa, the British Museum of Natural History, London, and the Fielding Herbarium of Oxford University.

#### POLYPODIACEAE.

1. *Woodsia glabella* R. Br. apud Richardson—Dundas Harbour, Malte 1927 (O.G, C).

#### EQUISETACEAE.

2. *Equisetum arvense* L.—Dundas Harbour, Malte 1927 (O.G), Polunin 1936.

#### LYCOPODIACEAE.

3. *Lycopodium Selago* L.—"Cape Warrender" (McClintock ex Markham 1909, p. 246); Dundas Harbour, Polunin 1934 & 36.

#### GRAMINEAE.

4. *Hierochloe alpina* (Sw.) R. & S.—Cape Sparbo, Anderson 1928 (O); Cape Warrender, Ross 1824 (K); Dundas Harbour, Soper 1923 (O.C), Malte 1927 (O.G), Polunin 1934 & 36; between Beechey Island and Northumberland Sound, Lyall 1852 (K); "Lancaster Sound" (Walker ex Hooker 1861, p. 85).

1. In this paper Simmons mentions a total of about 36 species of vascular plants from "North Devon". In his subsequent "Phytogeography" (1913, p. 25) he collects together and adds the records of previous investigators, so enumerating 58 species. These, however, include several of Sutherland's which had been gathered in Baffin (cf. Polunin 1936, p. 411).

2. Naturalist Horner gathered only a few common plants when visiting Beechey Island during the "Pandora" voyages of 1875-6, his reports being so merged in generalizations that his name does not appear in the detailed records which follow. These records give the chief points at which the other 15 investigators collected.

3. This work was designed to mention all plant names which have been published either erroneously or as synonyms from Devon Island or surrounding areas. It is accordingly considered unnecessary to repeat such extra names here, just as it is thought undesirable to include doubtful or ambiguous records.

4. An asterisk implies that the specimen has not actually been seen by me but is reported on the authority of a reliable author as occurring in the herbarium indicated.

5. *H. pauciflora* R. Br.—Dundas Harbour, Malte 1927 (O,G), Polunin 1936.
6. *Alopecurus alpinus* Sm.—plentiful records<sup>5</sup>
7. *Arctagrostis latifolia* (R.Br.) Griseb.—Dundas Harbour, Polunin 1934 & 36; Cuming Creek, Borden 1904 (O) 63096; 'Wellington Channel', Lyall 1853 (K).
8. *Calamagrostis neglecta* (Ehrh.) Gaertn. var. *borealis* (Laestad.) Kearney—Dundas Harbour, Polunin 1934.
9. *Deschampsia brevifolia* R.Br. (*Aira arctica* Spreng.)—"Cape Vera" (Simmons 1913, p. 46).
10. *D. pumila* (Ledeb.) Ostenfeld—Dundas Harbour, Polunin 1934.
11. *Trisetum spicatum* (L.) Richt. var. *Maidenii* (Gandoger) Fernald—Dundas Harbour, Malte 1927 (O,G) 118474, Polunin 1934 & 36.
12. *Catabrosa algida* (Soland.) Fries—plentiful records<sup>5</sup>.
13. *Pleuropogon Sabinei* R.Br.—Dundas Harbour, Polunin 1934 & 36; Powell Creek, Lyall (K).
14. *Poa abbreviata* R.Br.—"Boat Cape (Schei) and Cape Vera" (Simmons 1909, pp. 6 & 8); Dundas Harbour, Malte 1927 (O,G), Polunin 1934; Powell Creek, Lyall 1852 (K) as "*Poa laxa*"; Beechey Island, Lyall 1854 (K,S\*).
15. *P. glauca* M. Vahl—Dundas Harbour, Malte 1927 (O,G), Polunin 1934 & 36; Beechey Island, Lyall 1854 (K).
16. *P. arctica* R.Br.—plentiful records, incl. var. *vivipara* Hook. from "Cape Vera" (Simmons 1909, p. 8 sub nom. *P. cenisia* f. *prolifera*), from Dundas Harbour, Polunin 1934 & 36, from Beechey Island, Lyall-1854 (K,S\*) as "*Poa caesia*"; incl. apparent hybrid with *P. Pratensis* s.l. from Dundas Harbour, Polunin 1934 & 36; incl. from Cape Warrender, Parry 1825 (K) as "*Poa laxa*?"
17. *Dupontia Fisheri* R.Br.—Dundas Harbour, Polunin 1934 & 36; between Beechey Island and Northumberland Sound, Lyall 1852 (K).
18. *Puccinellia phryganodes* (Trin.) Scribn. & Merrill—Dundas Harbour, Malte 1927 (O,G), Polunin 1934 & 36.
19. *P. paupercula* (Holm) Fernald & Weathery—Dundas Harbour, Polunin 1936.
20. *P. angustata* (R.Br.) Rand & Redfield (agg.)—plentiful records, incl. as "*Glyceria distans*" and "*G. distans* var. *vaginata*".
21. *P. Vahlana* (Liebm.) Scribn. & Merrill—"West Fjord" (Simmons 1909, p. 7); Dundas Harbour, Polunin 1934 & 36.
22. *Festuca brachyphylla* Schultes—plentiful records, incl. as "*Festuca ovina*" and "*F. ovina* var. *supina*".

## CYPERACEAE.

23. *Eriophorum Scheuchzeri* Hoppe—Dundas Harbour, Malte 1927 (O,C), Polunin 1934 & 36; Powell Creek, Lyall 1852 (K).
24. *E. angustifolium* Roth (*E. polystachyon* of authors, possibly not L.)—plentiful records.
25. *Kobresia Bellardi* (All.) Degland apud Loisel—Dundas Harbour, Malte 1927 (O, G,C) 118659, 118667, Polunin 1934 & 36.
26. *K. simpliciuscula* (Wahlenb.) Mackenzie (*K. caricina* Willd.)—Dundas Harbour, Polunin 1934 & 36.
27. *Carex nardina* E. Fries—Dundas Harbour, Malte 1927 (O,G,C), Polunin 1934 & 36.
28. *Carex maritima* Gunn. (s.l.) (*C. incurva* Lightf.)—Dundas Harbour, Malte 1927 (O,G), Polunin 1934 & 36, incl. nos. 750, 810, 818, 820, 2512, 2521 var. *setina* (Christ) Fernald.
29. *C. ursina* Dewey—Dundas Harbour, Polunin 1934 & 36.
30. *C. bipartita* All.—Dundas Harbour, Malte 1927 (O,G,C) 118499 heterogeneous, Polunin 1936.
31. *C. rupestris* All.—? Cape Sparbo, Anderson 1928 (O); Dundas Harbour, Polunin 1934 & 36.
32. *C. scirpoidea* Michx. (s.l.)—Dundas Harbour, Malte 1927 (O,G,C), Polunin 1934 & 36.
33. *C. atrofusca* Schk. (*C. ustulata* Wahlenb.)—Dundas Harbour, Malte 1927 (C), Polunin 1934 & 36.
34. *C. misandra* R.Br.—Dundas Harbour, Soper 1923 (O,C), Malte 1927 (O,G,C), Polunin 1934 & 36.
35. *C. Bigelowii* Torrey ex Schwein. (*C. rigida* Good. not Schrank, *C. concolor* of authors, not R.Br.)—Cape Sparbo, Anderson 1928

5. I.e. from almost all around the island, so that they are not considered worth citing individually.

6. Subsidiary forms of this species will be dealt with in my forthcoming "Botany of the Canadian Eastern Arctic, Part I". Typical *C. bipartita* (*C. lagopina* Wahlenb., *C. Lachenalii* Schk.) appears to be absent from Devon Island.



(O); Dundas Harbour, Malte 1927 (O, G, C.) 118552, Polunin 1934 incl. nos. 758, 772, 801, 818 transitional to *C. aquatilis* var. *stans*.

36. *C. aquatilis* Wahlenb. var. *stans* (Drej.) Boott—Cape Sparbo, Anderson 1928 (O); Dundas Harbour, Malte 1927 (O, G) 118555, Polunin 1934 & 36; Powell Creek, Lyall 1852 (K).

37. *C. salina* Wahlenb.—Dundas Harbour, Polunin 1936 no. 2492 approaching var. *subspatheacea* (Wormskj.) Tuckerm. and nos. 2522, 2523 transitional to *C. aquatilis* var. *stans*.

38. *C. membranacea* Hook. (*C. membranopacta* L. H. Bailey)—Cape Sparbo, Anderson 1928 (O); Dundas Harbour, Polunin 1934 & 36.

#### JUNCACEAE.

39. *Luzula nivalis* (Laest.) Beurl. (*L. arctica* Blytt; *L. hyperborea* R.Br. in part)—Dundas Harbour, Malte 1927 (O, G, C), Polunin 1934 & 36; between Beechey Island and Northumberland Sound, Lyall 1852 (K) as "*Luzula confusa*"; 'Wellington Channel', Lyall 1853 (K) as "*L. confusa*".

40. *L. confusa* Lindeb. (*L. hyperborea* R.Br. in part)—Cape Sparbo, Anderson 1928 (O); Dundas Harbour, Polunin 1934 & 36; Powell Creek, Lyall 1852 (K); "Lancaster Sound" (Walker ex Hooker 1861, p. 84 sub nom. *L. arcuata*).

41. *Juncus biglumis* L.—"West Fjord, Cape Vera, Mount Belcher" (Simmons 1909, pp. 7, 8 & 9); Dundas Harbour, Malte 1927 (O, C), Polunin 1934 & 36; "Powell Creek and Wellington Channel" (Lyall ex Hooker 1857, p. 118).

42. *J. albescens* (Lange) Fernald—Dundas Harbour, Malte 1927 (O), Polunin 1934.

43. *J. castaneus* Sm.—Dundas Harbour, Polunin 1934 & 36.

#### LILIACEAE.

44. *Tofieldia coccinea* Richardson—Dundas Harbour, Malte 1927 (O, C) 118594, Polunin 1934? & 36.

#### SALICACEAE.

45. *Salix reticulata* L.—Dundas Harbour, Soper 1923 (C), Malte 1927 (O, N), Polunin 1934 & 36.

46. *S. herbacea* L.—Dundas Harbour, Polunin 1934 & 36; Powell Creek, Lyall 1852 (K).

47. *S. arctica* Pall. (s.l.)—plentiful records, incl. det. B.F. (loderus) as "*Salix arctica* x *callicarpaea*" and "*S. callicarpaea*".

#### POLYGONACEAE.

48. *Koenigia islandica* L.—Dundas Harbour, Polunin 1936.

49. *Oxyria digyna* (L.) Hill—plentiful records.

50. *Polygonum viviparum* L.—"Viks Fjord" (Schei ex Simmons 1909, p. 6); Dundas Harbour, Polunin 1934 & 36; Powell Creek, Lyall 1852 (K); Beechey Island, Lyall (K); "Wellington Channel" (Lyall ex Hooker 1857, p. 117).

#### CARYOPHYLLACEAE.

51. *Silene acaulis* (L.) L. var. *exscapa* (All.) DC.—Dundas Harbour, Malte 1927 (O, G, C), Polunin 1934 & 36.

52. *Lychnis furcata* (Raf.) Fernald (*Melandrium affine* of authors)—Dundas Harbour, Polunin 1936; Beechey Island and neighbourhood, Lyall 1854 (K, S\*) as "*Lychnis apetala*".

53. *L. apetala* L.—Dundas Harbour, Malte 1927 (O, G, C) 118773 118774, Polunin 1934 & 36; "Cape Riley" (McClintock ex Markham 1909, p. 246); Beechey Island, Lyall 1854 (K, S\*); 'Wellington Channel', Lyall 1853 (K, S\*).

54. *Cerastium alpinum* L. (s.l.)—plentiful records.

55. *C. Regelii* Ostenfeld—Dundas Harbour, Polunin 1936; between Beechey Island and Northumberland Sound, Lyall 1852 (K); 'Wellington Channel', Lyall 1852 & 53 (K).

56. *Stellaria longipes* Goldie—"West Fjord, Cape Vera, Mount Belcher" (Simmons 1909, pp. 7, 8 & 9); Dundas Harbour, Soper 1923 (O) incl. f. *humilis* (Fenzl) Ostenfeld ex Grøntved, Malte 1927 (O, G) f. *humilis*, Polunin 1934 & 36 incl. f. *humilis*; Powell Creek, Lyall 1852 (K) f. *humilis*; Beechey Island, MacMillan 1908 (O) as "var. *laeta*"; between Beechey Island and Northumberland Sound, Lyall 1852 (K) f. *humilis*; 'East side Wellington Channel', Lyall 1852 (K).

57. *S. humifusa* Rottb.—Dundas Harbour, Malte 1927 (O, G, C), Polunin 1934 & 36.

58. *Arenaria rubella* (Wahlenb.) Sm.—"West Fjord, Cape Vera, Mount Belcher" (Simmons 1909, pp. 7, 8 & 9 sub nom. *Alsine*

vena); "Boat Cape" (Schei ex Simmons 1909, p. 6 sub nom. *Alsine verna*); Dundas Harbour, Malte 1927 (O,C) 118722 118723 118729, Polunin 1934 & 36; Beechey Island and neighbourhood, Lyall 1854 (K).

59. *A. Rossii* R.Br. apud Richardson—"West Fjord and Mount Belcher" (Simmons 1909, pp. 7 & 9); Dundas Harbour, Polunin 1936; Beechey Island and neighbourhood, Lyall 1854 (K); between Beechey Island and Northumberland Sound, Lyall 1852 (K); 'East side Wellington Channel,' Lyall 1852 (K).

60. *Sagina intermedia* Fenzl—Dundas Harbour, Polunin 1934 & 36.

#### RANUNCULACEAE.

61. *Ranunculus hyperboreus* Rottb.—Dundas Harbour, Polunin 1934 & 36.

62. *R. nivalis* L.—Dundas Harbour, Malte 1927 (O,G,C), Polunin 1934 & 36; between Beechey Island and Northumberland Sound, Lyall (K\*)<sup>8</sup>.

63. *R. sulphureus* Solander apud Phipps—"Cape Vera" (Simmons 1909, p. 8); Dundas Harbour, Malte 1927 (O,G,C), Polunin 1934 & 36; Cuming Creek, Borden 1904 (O) 26906 as *R. nivalis*."

#### PAPAVERACEAE.

64. *Papaver radicum* Rottb.—plentiful records, incl. var. *albiflorum* Lange from "Cape Vera" (Simmons 1909, p. 8 sub nom. f. *Hartianum*), from Dundas Harbour, Polunin 1936.

#### CRUCIFERAE.

65. *Cochlearia officinalis* L. (s.l.)—plentiful records, incl. var. *groenlandica* (L.) Gelert from "West Fjord, Cape Vera, Castle Island, and Devils Island" (Simmons 1909, pp. 7 et seq.), from Dundas Harbour, Malte 1927 (O, G, C).

66. *Eutrema Edwardsii* R.Br.—Dundas Harbour, Malte 1927 (O,G,C), Polunin 1934 & 36; Powell Creek, Lyall 1852 (K. pars).

67. *Cardamine bellidifolia* L.—Dundas Harbour, Malte 1927 (O), Polunin 1934 & 36 incl. f. *laxa* (Lange) n. comb. (*Cardamine bellidifolia* L. var. *laxa* Lange, Medd. om Groenland, III, p. 251, 1887).

68. *C. pratensis* L. var. *angustifolia* Hook.—Dundas Harbour, Polunin 1936; Beechey Island, Pullen 1852 (K, pars) as "*Cardamine digitata*".

69. *Draba alpina* L. (s.l.)—plentiful records, incl. from Dundas Harbour, Malte 1927 (O,G) 118897 var. *gracilescens* Simmons as "*D. alpina* x *lactea*", and 118899 var. *nana* Hook. emend. Fernald as "*D. Bellii*", Polunin 1934 & 36 typical form and var. *nana* from Beechey Island, Lyall 1854 (K) apprg. *D. subcapitata*, Borden 1904 (O) 26913 var. *nana* as "*D. Bellii* f. *gracilis* potius ad *D. macrocarpum*" scr. Ekman, MacMillan 1908 (O) 77274 var. *nana* as "*D. Bellii*", Soper 1923 (O) 111536 var. *nana* as "*D. Bellii*", Malte 1927 (O,G) 118894 var. *nana* as "*D. Bellii* f. an var. *svalbardensis*" scr. Ekman.

70. *D. subcapitata* Simons—"West Fjord, Devils Island, Mount Belcher, Castle Island, and Cape Vera" (Simmons 1909, pp. 7 et seq.); Beechey Island, Lyall 1854 (K,S\*) as "*D. micropetala*"; 'Northumberland Sound', Lyall 1853 & 54 (K).

71. *D. fladnizensis* Wulfen ex Jacquin (s.l.)—Dundas Harbour, Malte 1927 (O,G) incl. 118914 as "*D. fladnizensis* x *lactea*" and 118906 as "*D. lactea*", Polunin 1934 & 36; "Cuming Creek" (Borden ex Macoun 1906 p. 320 sub syn. *D. Wahlenbergii*); Powell Creek, Lyall 1852 (K) as "*D. rupestris*"; between Beechey Island and Northumberland Sound, Lyall 1852 (K); 'East side Wellington Channel', Lyall 1852 (K) as "*D. micropetala*".

72. *D. nivalis* Liljeb. —Dundas Harbour, Malte 1927 (O), Polunin 1934 & 36.

73. *D. glabella* Pursh var. *brachycarpa* (Rupr.) Fernald—"Castle Island" (Simmons 1909, p. 11 sub nom. *D. hirta*); 'East side Wellington Channel', Lyall 1853 (K) as "*D. hirta*".

74. *D. cinerea* Adams (*D. arctica* J. Vahl)—'Wellington Channel', Lyall 1852 (K) apprg. *D. glabella* as "*D. groenlandica*" scr. Ekman; Beechey Island, Lyall 1854 (K).

75. *Braya purpurascens* (R.Br.) Bunge apud Ledeb.—Dundas Harbour, Malte 1927 (O,G) 118930 var. *dubia*, Polunin 1934 & 36 incl. var. *dubia*; Powell Creek, Lyall 1852 (K, pars) as "*Eutrema Edwardsii*".

8. J. D. Hooker (1857, p. 116), when dealing with Dr. Lyall's collections, gave "Beechey Island and Northumberland Sound" as distinct localities for this species. Owing to confusion with *R. sulphureus* it seems best to ignore all unconfirmed reports of members of this group.

## SAXIFRAGACEAE.

76. *Saxifraga rivularis* L.—“West Fjord” (Schei ex Simmons 1909, p. 7); Dundas Harbour, Malte 1927 (O,G,C), Polunin 1934 & 36; Powell Creek, Lyall 1852 (K); “East side Wellington Channel”, Lyall 1852 (K).
77. *S. cernua* L.—plentiful records, incl. f. *latibracteata* (Fernald & Weatherby) Polunin from Beechey Island, Soper 1923 (O) 111555, Malte 1927 (O,G) 118966.
78. *S. caespitosa* L. (*S. groenlandica* L.)—plentiful records, incl. from “Devils Island,” “*S. groenlandica* f. *flavescens*” (Simmons 1909, p. 12).
79. *S. stellaris* L. var. *comosa* Retzius—“West Fjord” (Schei ex Simmons 1909, p. 7); Dundas Harbour, Malte 1927 (O, C), Polunin 1934 & 36.
80. *S. hieracifolia* Waldst. & Kit.—Dundas Harbour, Polunin 1936.
81. *S. nivalis* L.—plentiful records.
82. *S. tricuspidata* Rottb.—plentiful records, incl. f. *subintegrifolia* (Abrom.) Polunin from Dundas Harbour, Soper 1923 (O,G) 111568.
83. *S. flagellaris* Willd., ex Sternb.—no locality (McClintock ex Markham 1909, p. 246); “Cape Vera and Mount Belcher” (Simmons 1909, pp. 8 & 9); “Northumberland Sound” (Lyall ex Hooker 1857, p. 117); “Wellington Channel”, Lyall (K\*); Beechey Island, Lyall 1854 (K,S\*); “Baring Bay and Caswalls Tower” (McCormick 1884, pp. 86 & 127); Cape Riley, Pullen (K\*).
84. *S. Hirculus* L.—plentiful records, incl. var. *propinqua* (R.Br.) Simmons.
85. *S. oppositifolia* L.—plentiful records, incl. f. *pulvinata* Andersson & Hesselman.
86. *Chrysosplenium alternifolium* L. var. *tetrandrum* Lund—Dundas Harbour, Polunin 1936; “Wellington Channel”, Lyall 1853 (K).

## ROSACEAE.

87. *Potentilla emarginata* Pursh—Dundas Harbour, Soper 1923 (O) 111584 apprg. *P. rubricaulis* Lehm., Malte 1927 (O,G,C) 119073 119088 119092, Polunin 1934 & 36, incl. 780c 791 2494 apprg. *P. rubricaulis*.
88. *P. rubricaulis* Lehm.—Dundas Harbour, Malte 1927 (O,G) 119097 as “*P. Peder-*

senii”, and 119091 apprg. (hybrid with ?) *P. pulchella* R.Br. as “*P. groenlandica* x *pulchella*”, Polunin 1936; Cape Riley, Pullen (K\*).

89. *P. pulchella* R.Br.—“West Fjord” (Simmons 1909, p. 7); “Lancaster Sound” (Walker ex Hooker 1861, p. 83 sub nom. *P. nivea* var. *pulchella*); Dundas Harbour, Malte 1927 (O,G,C), Polunin 1936; Powell Creek, Lyall 1852 (K); Beechey Island and near, Lyall 1854 (K,S\*); Northumberland Sound” (Lyall ex Hooker 1857, p. 116).
90. *Dryas integrifolia* M. Vahl—plentiful records, incl. from “Cape Riley” (McClintock ex Markham 1909, p. 245 sub nom. *D. octopetala*).

## ONAGRACEAE.

91. *Epilobium latifolium* L.—Dundas Harbour, Polunin 1934 & 36.

## ERICACEAE.

92. *Rhododendron lapponicum* (L.) Wahlenb.—Dundas Harbour, Malte 1927 (O,G,C), Polunin 1936.
93. *Cassiope tetragona* (L.) D. Don—plentiful records.
94. *Vaccinium uliginosum* L. var. *alpinum* Bigel.—Dundas Harbour, Soper 1923 (O,C) 111653, Malte 1927 (O,C), Polunin 1934 & 36.

## PLUMBAGINACEAE.

95. *Armeria labradorica* Wallr.—Dundas Harbour, Malte 1927 (O, G, C) 119107, Polunin 1934.

## BORAGINACEAE.

96. *Mertensia maritima* (L.) S. F. Gray var. *tenella* Fries—Dundas Harbour, Malte 1927 (O,G,C), Polunin 1934.

## SCROPHULARIACEAE.

97. *Pedicularis sudetica* Willd.—Dundas Harbour, Malte 1927 (O,C), Polunin 1934 & 36.
98. *P. hirsuta* L.—“Lancaster Sound”, Walker 1857 (K); Dundas Harbour, Malte 1927 (O,C), Polunin 1934 & 36; Cuming Creek, Borden 1904 (O\*); between Beechey Island and Northumberland Sound, Lyall 1852 (K); “Wellington Channel” (Lyall ex Hooker 1857, p. 117).
99. *P. flammia* L.—Dundas Harbour, Polunin 1936.
100. *P. capitata* Adams—Dundas Harbour, Malte 1927 (O,G,C), Polunin 1934 & 36.

9. Subsidiary forms of this species will be dealt with in my “Botany of the Canadian Eastern Arctic, Part I”.

## CAMPANULACEAE.

101. *Campanula uniflora* L.—Dundas Harbour, Polunin 1934 & 36.

## COMPOSITAE.

102. *Antennaria labradorica* Nutt.—Dundas Harbour, Polunin 1934.  
 103. *Chrysanthemum integrifolium* Richardson—Cape Sparbo, Anderson 1928 (O).  
 104. *Taraxacum phymatocarpum* J. Vahl (s.l.)—Cape Sparbo, Anderson 1928 (O).

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## A QUANTITATIVE STUDY OF MUSKRAT FOOD

By L. BUTLER



ANY studies have been made (Errington et al.), of the social and breeding habits of the muskrat, *Ondatra zibethica* and most of these accounts have been prefaced by some qualitative feeding data; but no one has tried to arrive at a quantitative estimate of the amount of natural food required by an individual muskrat. This study was undertaken with the twofold purpose of finding how much of each type of food muskrats normally consume, and whether food plays an important part in the population cycle. These experiments were carried out on the Hudson's Bay Company's

marsh near Mafeking, Manitoba. The marsh is fed by the Steeprock River, and has an abundant supply of natural muskrat food and a fairly stabilized water level.

Plants growing on the marsh, which are used by muskrat for food, are listed in order of their importance in Table No. 1. There is nothing unusual in the first two plants on the list as cattail and bulrush are recognized by most investigators as important food plants, but the third one has never been mentioned in this capacity. *Equisetum fluviatile* or stovepipe reed grows in two to four feet of water and is found

growing extensively in many parts of Manitoba and Saskatchewan. The hollow stems of this plant, especially the greener parts above water, are used for food. Penned animals would eat them quite readily and choose them in preference to many recognized food plants. Muskrats in the marsh were observed swimming around biting off the cones and cutting the stems just below the water line; taking them to feeding platforms and consuming the whole stem. No feeding platforms composed mainly of this species were found

but most feeding platforms and feces samples contained remnants of stove-pipe reed. This species was also used quite extensively in house-building. The buckbean, *Menyanthes trifoliata*, has not been mentioned before as a food plant. The thick stems of this plant which grows in from four to five feet of water are much used for food in the winter and early spring. The young leaves and shoots are also consumed during the summer.

TABLE No. 1  
FOOD PLANTS FOUND ON THE MARSH, LISTED IN ORDER OF THEIR IMPORTANCE

Scientific Name	Common Name	Parts Consumed
<i>Typha latifolia</i> .....	cattail .....	base of culm, roots.
<i>Scirpus validus</i> .....	bulrush .....	base of culm.
<i>Equisetum fluviatile</i> .....	stovepipe reed .....	stems.
<i>Phragmites communis</i> .....	thatch grass .....	stem, leaves, roots
<i>Acorus calamus</i> .....	sweet flag .....	rootstocks and base of culm.
<i>Menyanthes trifoliata</i> .....	buckbean .....	rhizomes, young leaves.
<i>Carex</i> , spp. ....	sedge .....	base of culm.
<i>Nymphaea advena</i> .....	water lily .....	rootstocks.
<i>Sagittaria latifolia</i> .....	arrowhead .....	leaves and bulbs.
<i>Alisma plantago-aquatica</i> .....	water plantain .....	leaves.
<i>Potamogeton</i> spp. ....	pondweeds .....	stems.
<i>Calla palustris</i> .....	wild calla .....	rootstocks and leaves.
<i>Vallisneria spiralis</i> .....	eel grass .....	leaves.

Observations of feeding platforms and microscopic examination of feces showed that although all plants in Table No. 1 were fed upon at some time during the summer there were seasonal preferences. The seasonal changes in the consumption of four species are shown in Table 2. Examination of this table brings out the following information.

1. The consumption of bulrush increased from June until the middle of August and then fell off again. This period of greatest consumption probably corresponds with the season of greatest palatability. It was noticed that bulrushes pulled easiest during this period, and that a larger proportion of them possessed firm white bases instead of the soft discoloured ones found later in the season. In late August the seeds were firmly formed and, it is probable by analogy with important agricultural foodstuffs, that decreased palatability and nutritive power would follow this maturity.

2. The cattail shows a definite decrease in consumption from June to the middle of August.

This is the period of flowering and the bases of the culms are exceedingly woody at this time. The increased consumption from the middle of August was caused by the growth of young plants either as shoots from established roots or as seedlings.

3. The consumption of sweet flag was fairly steady throughout the season except for a week or ten days near the end of July. At this time whole beds of this species were literally mowed down and many of the rootstocks uprooted and consumed. No natural explanation was found for this feeding behaviour.

4. Sedge shows a constant consumption except for the week ending July 29th. This was a week of abnormal rains and resulting floods which drove most of the muskrats from their home ranges and normal feeding grounds. Many animals were, therefore, forced to feed in shallow water and the result was an enormous increase in the consumption of sedge and a corresponding decrease in the consumption of bulrush.

TABLE No. 2

*The Percentage Consumption of Certain Foods During the Summer Months.*

	Week-ending											
	JULY					AUGUST				SEPTEMBER		
	1	8	15	22	29	5	12	19	26	2	9	16
Bulrush .....	23	28	46	36	18	41	52	45	25	25	30	25
Cattail .....	36	28	24	12	2	3	2	14	30	35	25	35
Sweetflag .....	15	16	10	32	14	16	16	13	13	13	15	10
Sedge .....	6	4	3	7	34	8	4	8	8	7	7	8

Whether this seasonal selection was determined by palatability alone or by some nutritional craving could not be determined. An attempt was made to assess palatability by giving the penned animals a simultaneous choice of several species, but no definite results were obtained. It was found that differences in individual tastes existed, and that the type of food previously fed influenced the animals' choice. Indeed it would seem that the type of food to which animals are accustomed plays an important part in food selection.

In Minnesota, it was found that captive beavers, which were fed on corn and later released, persisted in putting up corn for their winter food.

The main point established by the examination of feeding platforms and feces samples is that muskrats like variety in their food plants.

FEEDING TRIALS

Six cages, each six feet by three feet, were built and placed in a sloping position with their lower ends in from three to six inches of water. A single muskrat obtained from the wild by live trapping was liberated in each. A counted number of food plants were placed in the pens each evening and a note made in the morning of the number consumed. If all were consumed, the number fed was increased on succeeding nights until a surplus of food was offered. Usually only one species was fed each time but towards the end of the experiment, after constants were established for different types of food, a mixture of two species was offered. In establishing the constants, the animals were fed on one species for six days. The total number of this species consumed, divided by the number of animal days, was taken as the average daily consumption of this food species. The values obtained in this manner are given in Table No. 3.

It is realized that these values are obtained with penned instead of free animals, but since this amount of food caused the penned animals to put on weight, we have every reason to believe that it would maintain animals in the wild state. Another objection is the seasonal palatability of the different food species. This was impossible to overcome in pen feeding, only species in favour at the time were fed. Thus, it was impossible to get feeding constants for some of the species. The amount of food eaten at different seasons of the year is not necessarily constant, so the values given may not apply to winter or early spring.

CARRYING CAPACITY OF A SWAMP

The determination of the amount of food necessary to support a muskrat is only the first step in assessing the carrying capacity of a marsh. Next, the amount of food present must be estimated. The density of the different food stands was determined by taking quadrant counts and the results of these for the different species are given in the second column of Table No. 3. From these two figures the carrying capacity per acre of each species can be calculated, these are given in column three of Table No. 3. These figures do not allow for freezing and wastage. Some method must be found of estimating these values before the figures in column three become of much practical value. It was found, however, that when the relative acreages of each food species in the Steeprock Marsh were estimated, the marsh would support fifteen muskrats per acre. Allowing one third for wastage and winter freezing, we find that the marsh would support ten muskrats per acre before the food supply would become the limiting factor. It would seem from the work of Errington that other factors, such as intra-specific strife, would become operative before such a density was reached.

TABLE No. 3  
Amount of food available and quantity consumed by muskrats.

	Amount consumed per muskrat per day	Amount of food per sq. yd.	Carrying capacity per acre
Stovepipe reed	128 $\pm$ 9.5 stems	179.4 $\pm$ 8.2 stems	18 muskrats
Sedge	46.2 $\pm$ 3.1 plants	75.3 $\pm$ 3.1 plants	3 muskrats
Thatch grass	40.5 $\pm$ 2.3 stems	81.0 $\pm$ 3.3 stems	26 muskrats
Sweet flag	29.1 $\pm$ 2.2 plants	59.1 $\pm$ 2.8 plants	26 muskrats
Bulrush	25.3 $\pm$ 1.2 stems	3.3 $\pm$ 1.2 stems	17 muskrats
Buckbean	22.7 $\pm$ 2.6 stems	10.8 $\pm$ 1.1 stems	6 muskrats
Cat-tail	20.5 $\pm$ 3.2 plants	35.1 $\pm$ 1.4 plants	23 muskrats

#### BEHAVIOUR OF PENNED ANIMALS

The animals were rather unsettled for the first two days but after that five of the six animals became quite tame. After two weeks of captivity they would climb up the sides of the pen and beg for food. One animal never became tame and would not come out for food if anyone was around. When the animals were released, a small hole was made in the pen for them to get out. They quickly found the hole and went out on frequent excursions during the evening, returning to their own pen after each excursion. If they were disturbed while on one of these excursions, they ran back into their pen and hid in the house. This seemed rather surprising behaviour to the writer, since the pens were quite close to extensive cattail beds, and within thirty yards of the spot where they were trapped. It would appear that the six weeks captivity either caused the animals to forget the refuges in their former home ranges, or made them familiar with the refuge afforded by the pen.

#### SUMMARY

A list of the chief species of plants consumed by muskrats on a marsh in Northern Manitoba is given.

It is pointed out that the stovepipe reed (*Equisetum fluviatile*) and buckbean (*Menyanthes trifoliata*) have never been mentioned as food plants.

Six penned animals were given measured amounts of food and the amount consumed was noted.

An attempt is made to assess the food possibilities or carrying capacity of a marsh area.

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## THE STUDY OF HEPATICS (LIVERWORTS) IN CANADA

By A. H. BRINKMAN



SOONER or later, amateur botanists, after having "worked" up the flora of their own districts, seek for "new worlds to conquer", and quite frequently, if a microscope is available, it is mosses and hepatics that are studied next. Both of these groups are interesting, but those who have studied both usually prefer the hepatics. This is not strange,

for the hepatics have a diversity of forms that keeps up interest until the last.

One of the interesting points, to me, is their past history. Since they possess no woody tissues, it would seem impossible for any of them to be preserved, and it is not surprising that fossil specimens are very rarely found. The fossil hepatics available carry us back hundreds of



millions of years to the Pennsylvanian era. Even then, if *Marchantites* was even partly like the present *Marchantia*, it already had a highly complicated structure, so that we have to go back still further to arrive at the origin of the hepatics. This ancient lineage is of great interest, for among the ancestors of the hepatics, we may have to look for the ancestors, not only of our present dominant plant life, but for the dominant plant life of the Pennsylvanian age.

In this group we have many different gradually evolving and connected life histories. *Riccia*, for example has the reproductive organs sunk in the surface of the upper side of the thallus and releases its spores by the disruption of the parent plant. Others have a broadly lobed, flat thallus bearing erect, variously shaped reproductive branches while others again have a thallus shaped like the frond of a fern, often profusely branched and bearing sporogonia on delicate stalks from the apices of the branches.

This interesting chain shows how nature has built up from the simple to the most complicated forms, all within the same group.

The student might devote his time to a genus such as *Lophozia*, and find some species with such a complete chain of forms that in any two, or even more species there may be occasions when specimens cannot be identified with certainty. These forms exhibit gradual, though small, differences in the size of the cells, always measured in microns, gradual differences in cell-wall thickenings, especially at the angles, and gradual differences in the border of the fruiting organs. The perianths vary from slight projections to well-formed teeth, and from forms almost smooth to others deeply folded and lobed. One feels that there is being displayed before his eyes the slow evolution of plant life. While I mentioned only *Lophozia*, these facts are equally true of other genera.

Even the spores have their distinctive markings, in some groups merging from one to the other, while the evolution of those distinctive organs of the hepatics, the elaters, whose function is to help disperse the spores, can be traced from simple joined cells to beautiful three-banded spirals. Is it any wonder then that so many, when confronted with the choice between mosses or hepatics, chose the latter?

The study of distribution is most fascinating in this group. Although the spores mostly range between one hundredth and one fiftieth of a millimetre in diameter, a size which allows them to be carried by the wind over immense distances,

we have as distinct separation as though we were dealing with trees, and not plants that are often measured in millimetres, and rarely in more than centimetres. *Bucegia romanica* Radian is a good example. It is found just west of Banff, at Revelstoke and at various other places in the mountains but nowhere else in Canada or North America. We find the same species again isolated in the Carpathian Mountains of Europe<sup>1</sup>. In *Diplophillum* we find two species in Eastern North America ranging from Nova Scotia to Carolina, quite closely related to a species known from Europe, but not found in Eastern America although known also from Western North America, where it apparently migrated at the time when Western North America and Asia were joined by land. Two other members of the genus are circumpolar reaching across North America and boreal regions of Eurasia. There is another species ranging from Alaska to Washington and across into Asia, but unknown east of the Cordillera, and yet another species known only from an isolated spot near the Alaska-Yukon boundary. In the polymorphous *Scapania nemorosa* we have three forms confined to the Pacific states while the parent species of the group is not definitely known to occur in the west, except for one isolated station on Vancouver Island, but is common in the east and also in much of Europe. Nevertheless one of these strictly western American forms has a very closely related form in Sweden. This is also true of the equally polymorphous *Scapania paludosa*, where one form peculiar to the west is also found in Sweden. Is it any wonder then that the students of hepatics find the group so interesting?

There is yet another point of interest left. In some forestry work carried out in order to attempt correlation of tree growth with that of the forest floor, the relation of the hepatics to relative humidity was found most informative. This is the more strange because so many hepatics do not grow directly on the ground, and comparatively few reach into the soil, yet as moisture conditions changed, there was found to be a change in the different species of hepatics occupying the sites.

A more general and widespread relation is that between the flat or thalloid hepatics, and the leafy hepatics. The former strongly predominate in arid situations, in California, Arkansas, etc., often occurring in such situations and sites alone; the latter are at home in either moist, wooded

1. C. C. Haynes, "The Bryologist" 18:93 (1915).

or alpine situations, and the correlation between species and site or habitat is often very close. Perhaps a point of main interest to many is the fact that so much has yet to be learned about distribution, so that when one is working with this group of plants, it is not at all unusual to come across new records and unexpected extensions of range. Sometimes a species will turn up hitherto unrecorded for North America, but known to exist in Europe. In North America large areas are as yet unexplored as far as hepatics are concerned and species new to science are yet to be found. Thus there are, as yet unpublished, one new species from Nova Scotia, one from California, two from British Columbia, one from Alberta and one from Ontario. This clearly shows that plenty of work yet remains to be done.

With regard to suitable handbooks on hepatics we are in a fortunate position since a British manual, Macvicar's *Handbook of Hepatics*, covers nearly all species known to occur in Canada. Also Lois Clark and T. C. Frye, University of Washington, Seattle, have published two very reasonably priced works giving descriptions and figures of most of those species not figured by

Macvicar. Another point will crop up, that of help in the study and naming of material. Personally, while full of gratitude for the generous help given to me by so many workers in the United States, I do feel it to be unfortunate that we in Canada should be content to leave ourselves so entirely dependent upon the good will of specialists in the United States who are already crowded with work. I am myself willing to undertake the naming of hepatics collected by Canadian workers, as long as patience is used and no quick answers expected, trying to give to others the help so generously given to me. Numbered specimens in duplicate are required in order that specimens can be referred to by number and in order that specimens may be available for future reference by both the collector and the namer.

There is one disadvantage with hepatics, they are very rare on the prairie, being essentially lovers of moist woodlands and mountains, and when present on the plains they prefer wet or wettish locations, where sometimes rarities can be found in wet years, while looked for in vain in dry years. On the prairies, mosses, though far from common, take the place of hepatics in interest.

## LAND MOLLUSCS OF HASTINGS COUNTY, ONTARIO

By REV. H. B. HERRINGTON and JOHN OUGHTON



THE FOLLOWING list is based upon specimens collected by one of us (H. B. H.) during the past two years. Large samples of drift brought down by the rivers at flood-time have been searched for shells, while additional specimens have been collected in their haunts. The material basis for these records has been deposited in the Royal Ontario Museum of Zoology.

Hastings County is a narrow oblong extending northwards from the eastern end of Lake Ontario. Its width varies between twenty-five and thirty miles, while its length is almost one hundred miles. Most of the specimens herein reported were collected in the southern third of the county in the vicinity of Thomasburg.

1. *Polygyra albolabris* (Say).
2. *Polygyra fraterna* (Say). Some of our specimens vary considerably in altitude.
3. *Polygyra palliata* (Say).
4. *Polygyra sayana* Pils.
5. *Polygyra tridentata* (Say).
6. *Haplotrema concavum* (Say).

7. *Mesomphix cuprea* Raf. (= *Omphalina fuliginosa* (Griffiths)).
8. *Vitrina limpidula* Gould.
9. *Hawaia minuscula* (Binney) in drift.
10. *Striatura exigua* (Stimps.).
11. *Striatura milium* (Morse).
12. *Retinella binneyana* (Morse). This species seems to prefer higher and drier situations than does *R. hammonis*.
13. *Retinella hammonis* (Ström).
14. *Retinella indentata* (Say). A few specimens.
15. *Paravitrea multidentata* (Binn.). 1 lot in leaf mould.
16. *Helicodiscus parallelus* (Say).
17. *Oxychilus cellarius* (Müller). 1 specimen.
18. *Euconulus fulvus* (Müller). Apparently more abundant than the following species.
19. *Euconulus chersinus polygyratus* (Pils.).
20. *Zonitoides arboreus* (Say).
21. *Zonitoides nitidus* (Müller). Abundant in drift.
22. *Deroceras agreste* (L.). This introduced species of slug was found at Thomasburg.

23. *Deroceras gracile* Raf. (= *D. laeve campestre* (Binney)). Native species; in woods.

24. *Anguispira alternata* (Say).

25. a. *Gonyodiscus cronkhitei anthonyi* (Pils.) Apparently the more common variety.

b. *Gonyodiscus cronkhitei catskillensis* (Pils.)

26. *Gonyodiscus perspectiva* (Say). Two lots were taken near Thomasburg, one alive, the other dead in drift. This species is uncommon in the province, being restricted to the more southern part.

27. *Punctum pygmaeum* (Drap.). (= *minutissimum* (Lea)). In drift.

28. *Philomycus carolinensis* (Bosc.) In woods.

29. *Pallifera dorsalis* (Binney). In woods.

30. *Succinea avara* (Say).

31. *Succinea ovalis* (Say).

32. *Succinea retusa* (Lea).

33. *Strobilops labyrinthica virgo* (Pils.).

34. *Gastrocopta armifera* (Say). A few in drift.

35. *Gastrocopta contracta* (Say). In drift.

36. *Gastrocopta corticaria* (Say). A few shells in drift.

37. *Gastrocopta holzingeri* (Sterki). A rather large number of this little species was obtained in drift.

38. a. *Gastrocopta pentodon* (Say). Most of our specimens of this species belong to the typical form.

b. *Gastrocopta pentodon gracilis* (Sterki). A few shells.

39. *Gastrocopta tappaniana* (C. B. Adams). More abundant than *pentodon* in drift and apparently preferring wetter situations.

40. *Pupilla muscorum* (L.). In drift; chiefly the form *unidentata* (Pfr.).

41. *Vertigo bollesiana* (Morse). Not as abundant as *V. gouldii* in drift. The apertural teeth of two specimens were more numerous than usual. In both examples there was a bifid basal. In one of these there was also a small angular.

42. a. *Vertigo gouldii* (Binn.) Abundant in drift; a very variable species.

b. *Vertigo gouldii cristata* Sterki. A few.

c. *Vertigo gouldii paradoxa* Sterki. A few.

d. *Vertigo gouldii* var.

Our specimens are variable in regard to the position of the palatal teeth. In some examples, the palatal teeth, especially the lower member, are so deeply immersed in the "throat" that the naturalist is tempted to identify his shells with *Vertigo nylanderi* Sterki. However, from this latter species our specimens of *gouldii* differ in the following particulars.

1. Whorls especially the penult have flatter sides, while *nylanderi* has a bulging appearance.

2. The aperture lip is almost flat-sided, while *nylanderi* has a more distinct indentation.

3. Lower palatal teeth, never quite as deeply submerged.

43. *Vertigo milium* (Gould). Rare in drift samples, but perhaps preferring higher ground than do most of our Vertigos. One lot of specimens was obtained in leaf mould.

44. *Vertigo morsei* Sterki. A single lot of 11 shells was taken near Thomasburg in drift. These are the first specimens we have seen from the province. Length 2.45 to 2.80 mm., diameter 1.30 to 1.45 mm., whorls 5- $\frac{3}{4}$  to 6. Although some of our specimens of *V. ovata* approach *morsei* closely in shape and length, there are no intergrades between these two species in our series. *V. morsei* is larger and narrower, its aperture smaller, has one additional whorl, its superior columellar tooth is larger and differently shaped, and the body whorl is smaller.

45. *Vertigo ovata* (Say). A variable species; some specimens were almost as large as *morsei*, ranging up to a length of 2.40 mm., diameter 1.50 to 1.55 mm., whorls 5. Variation was also noticed in the number of apertural teeth. The angular tooth in some specimens was reduced or absent.

46. *Vertigo ventricosa elatior* Sterki.

47. *Columella edentula* (Drap.).

48. *Pupoides marginatus* (Say). 1 specimen was found in river drift at Frankford.

49. *Vallonia costata* (Müller). Several in drift. Greater diameter=2.5 mm.

50. *Vallonia parvula* Sterki. A large number of shells were taken in one sample of drift. These are the first examples of this species we have seen from the province. Compared with the more common *V. costata*, it differs as follows: much smaller size (greater diameter 2.0 mm.);  $\frac{1}{2}$  whorl less; the spire whorls distinctly flatter, the altitude of the whorls less; lip not so white and aperture disposed in a slightly more vertical plane.

51. *Vallonia excentrica* Sterki? A few specimens having an elongate umbilicus are provisionally referred here.

52. *Vallonia pulchella* (Müller). By far the most abundant representative of the genus in drift, where it occurs in large numbers.

53. *Cochlicopa lubrica* (Müller).

54. *Carychium exiguum* (Say). This species seems to prefer lower, wetter ground than the related species.

55. *Carychium exile canadense* Clapp.

## UTRICULARIA INFLATA IN CANADA

By MARGARET S. BROWN



AN INTERESTING addition to the flora of Canada was made on August 31st, 1939, when *Utricularia inflata* Walt. was discovered by the writer in Lake Sawlor, near Hubbard, not far south of Halifax, Nova Scotia. The water level of the lake was exceptionally low at the time of my visit and many rocks were showing above the surface.

Specimens, in full bloom, of this rare plant were obtained in this lake from two distinct places, floating among fragrant white water lilies (*Nymphaea odorata*), yellow cow lilies (*Nuphar advena*), tiny floating hearts (*Nymphoides lacunosum*) and colonies of pickerel weed (*Pontederia cordata*), all in a cosy, sheltered cove circled by the black reflections, upon the quiet waters, of spruce and hemlock trees lining the lake shore.

*Utricularia inflata* is easily distinguished from other members of this genus in Canada by the conspicuous whitish star-like whorl of the bladder-like petioles situated at the base of the slender, few-flowered scape, which is two inches in length. In Gray's Manual it is recorded from Maine to Texas but, according to Mr. A. E. Porsild of the National Herbarium of Canada,

to whom I sent specimens, there do not appear to be any authentic records from Canada. Mr. Porsild writes as follows: "Macoun's record<sup>1</sup> of *Utricularia inflata*: "Floating in still water in Lower Canada (Pursh)" is clearly a *lapsus calami*; what Pursh<sup>2</sup> actually wrote was: "Floating in ponds and lakes of Virginia and Lower Carolina."

Nova Scotia is exceptionally rich in bladderworts and *Utricularia inflata* is the eleventh species to be recorded from this province. The tenth species was *U. ochroleuca*, collected in 1929 on St. Paul's Island, N.S., by Lily M. Perry and Muriel V. Roscoe. This discovery was even more important since, as pointed out by Miss Perry<sup>3</sup>, this species had then been reported in North America only from Greenland.

The remaining nine species, most of which were first discovered by the Harvard expedition in 1923 are: *U. minor*, *U. geminiscapa*, *U. gibba*, *U. purpurea*, *U. cornuta*, *U. subulata*, *U. resupinata*, *U. intermedia* and *U. vulgaris* var. *americana*.

1. Cat. 2:375 (1884).
2. Fl. Am. Sept. 1:15 (1814).
3. Rhodora 33:113 (1931).

## NOTES AND OBSERVATIONS

FROGBIT—HYDROCHARIS MORSUS—RANAE. L. AT OTTAWA.—The manner in which Frogbit has established itself at Ottawa during the last few years is of interest. It was first noticed in July 1936, at which time it practically covered the surface of a shallow very small pond near the Rideau Canal in the Arboretum of the Division of Botany at Ottawa. Its white petals and small (2 in. diam.) heart shaped floating leaves set it aside as a newcomer to the district. American floras proved of little avail other than to point strongly to the HYDROCHARITACEAE family. Recourse to the floras of Engler-Prantl and Hegi however showed it to be the Frogbit, *Hydrocharis Morsus-ranae* L. of Europe and temperate Asia. As to its origin records of the Division revealed that plants of *Hydrocharis Morsus-ranae* L. from Zurich, Switzerland, were placed in a trench in the Arboretum on May 11, 1932. This trench connects the pond in which it was

first observed with the Rideau Canal. While the species was not observed until 1936 it must have been growing and spreading unobtrusively as it was present in quite large numbers when found. Its spread has continued and during 1939 it was found in the Rideau Canal. Since the plant is a floating one it would appear to be only a matter of time before it will be found in both the Ottawa and Rideau Rivers, carried there by boats or other means.

Its growth during the summer is very rapid. Stolons or runners are sent out which quickly give rise to new plants and they in turn to new stolons. So pronounced is this type of growth that when the flowers start to appear in July the surface of the water is covered with a mass of interwoven plants. In the fall buds or turions are produced by the stolons, they fall to the bottom to pass the winter in the mud and the next spring they rise to the surface to produce

new plants. Considerable experimental work has been carried out in Germany and England on the physiology of the germination of these buds. Writers of German text books recommend this plant very highly for class room work in plant physiology. It is easily cultured in aquariums or other containers and its roots possess very long root hairs in which such phenomena as streaming are clearly visible under the low-power microscope. Whether or not this new plant will be objectionable in waterways cannot be foretold at this time but to all appearances it is certainly here to stay.

—W. H. MINSHALL.

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THE EUROPEAN STARLING, *Sturnus vulgaris*, AT NORWAY HOUSE.—I first saw the European Starling on the 5th of May, 1939. They had just arrived and were feeding with the Blackbirds on the lawn on grain and birdseed which I had placed there for the birds arriving from the south. I counted seven starlings. As I have mentioned the starlings were in company with Blackbirds of all descriptions, but they seemed to be more closely attached to the Rusty Blackbirds. Both the Starlings and Rusty Blackbirds were seen for the first time at Norway House. I know this for a fact having kept a record of all strange and other birds which arrived here every spring for the past 22 years.

The starlings were very wild and to observe them more closely I had to use field glasses. The most outstanding things that I noticed about them were their yellow beaks and pinkish coloured feet. Their colouring was metallic purple green with very short tails and their walk a strut.

They stayed on the island for a couple of weeks and then left for the mainland about half a mile away. I used to see them once in a while after this but mostly in pairs or singly. About the middle of July when they returned to the island there were thirteen of them. One or two still had yellow beaks but the rest had dark beaks and feet and their plumage had altered to a dull olive grey and brown with the underparts spotted; at least some of them were that colouring, the others appeared to be of a darker colour. During their stay on the island they mostly fed on the green headed spruce sawfly (*Pikonima* sp.) caterpillar and other insects that are dangerous pests to the spruce and balsam trees. In this act alone they are beneficial to this part of the country. I did not notice them at any time feeding on any of the berry bushes or molesting the garden.

Towards evening the starlings would fly up to the top of the forestry tower which is 84 feet high and perch on it till sundown when they would leave for the mainland to return again in the morning. In no way did I see them interfering with the other birds and the only ones they seemed to mix with were the Rusty Blackbirds. I tried to trap them for banding purposes and observation but met with no success as they would not enter any of the traps I had set.

About the 1st of November just after snow fall they left the island and went over to the Indian Reserve and about the 15th of November after a heavy snowfall I only saw 5 starlings, the rest must have migrated southwards with the Rusty Blackbirds as they were also not seen on this date. Since the 15th of November to date (the 16th December) I have kept in touch with them. They seem to be much more wild, and live off the garbage heaps at the Indian Industrial School and Indian Agency.

During their stay here since the 1st of November the weather has been very cold and stormy at times, and the rest of the time it has been an exceptionally warm winter. We have had it 30 below zero here on several nights.

If the four starlings survive the winter and increase in numbers next summer, I am of the belief that they will be birds to welcome to this part of Northern Manitoba because as I have stated they only seem to live on insects and caterpillars that are a serious problem to the growth of our forests.—P. W. DURANT.

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MOCKINGBIRD *Mimus polyglottus*, WINTERING IN MANITOBA.—On November 15, 1939, a Mockingbird was observed at close range near my shack and banding station on the North Kildonan Bird Sanctuary, five miles north of Winnipeg, Manitoba. A few minutes later a second bird of the same species was seen, and permitted the writer to approach to within six feet before it flew to a nearby shrub. Both birds showed the characteristic white patches on wings and tails as they flew.

During the interval between November 15 and November 27, the birds were seen on several occasions by several people. On November 27 I put up a box-trap and removed the feeding station and on my next visit to the shack on November 29, succeeded in capturing one of the Mockingbirds 15 minutes after my arrival. It was banded No. 39-120 111 and released after a series of photographs was taken.

Both the banded and unbanded Mockingbirds continued to be seen around the shack until about December 16, at which time the banded one discontinued its visits. The unbanded Mockingbird was seen January 2, 1940, and may still be present in the area. The birds appear to feed principally on the berries of asparagus in near-by market gardens, but also visited two feeding stations where millet, sunflower seeds, peanuts and suet were available.

It is interesting to note that the only recent Mockingbird to be collected in the Winnipeg vicinity was picked up dead on the sanctuary on Christmas Day, 1928 by H. D. Whellams and contributed by the writer to the collection of A. G. Lawrence of this city. Since then several other sight records of the birds have been made. The present status of Mockingbirds in the province appears to be that of rare strays.

The Mockingbird which was banded measured  $9\frac{1}{4}$  inches in length, or an inch and a quarter less than the measurement given in *Birds of Canada* by P. A. Taverner. It was much darker, especially the underparts, than seen in any of the coloured plates and a size 2 bird band as given in the last issue of the Bird Banding Notes of the U. S. Biological Survey proved to be too large. It was banded with a size 1A band which was loose.

Weather conditions in Manitoba during the fall have been unusually mild, which probably is a factor in the birds surviving through December and into the New Year. Robins are still present on the sanctuary (January 7) and during the fall large flocks of Bohemian Waxwings fed on the asparagus berries.—A. B. GRESHAM.

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## EDITORIAL

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**LINKS WITH THE PAST.**—When one thinks of big trees it is the west of Canada with its giant firs and cedars that comes to mind rather than the east. It would be rank ingratitude, however, to forget that the foundations of the Canadian lumber industry were laid in the pineries of the east, where trees from three to five feet in diameter and of a height and grandeur surpassed only by the pick of the western crop were cut and square-hewn for shipment across the Atlantic.

There are many pineries left in eastern Canada, including even some large stands that have never felt the axe, but they are relicts in the cut-over area or stands near the limits of the range of the white pine (*Pinus Strobus* to which species belong the largest eastern pines), and seldom contain specimens like those that floated down the Ottawa and St. Lawrence eighty years ago. It is very gratifying therefore to learn that there are still some stands of white pine of the finest growth left, and doubly gratifying to know that such stands are to be found in Algonquin Provincial Park, in Ontario, one of the most popular recreational areas in the Dominion. Forestry operations had gone on in Algonquin Park long before it was established as a park and were not restricted by its establishment. Consequently, the old

pineries have disappeared one by one until now few are left.

The time has come when these remnants possess a value as monuments of living nature and links with the past far exceeding their value as saw-logs. The story of how a nation was built from the virgin forest takes on a new meaning if the virgin forest may still be seen. Also, scientists studying the biology of young pineries are better able to interpret their findings if they can check them against an old pinery on a similar site. For the past decade, therefore, the Ontario authorities have been setting aside in Algonquin Park reservations containing samples of the virgin forests, and in recent discussion (*Forestry Chronicle*, Vol. 15, No. 4, Dec. 1939) of the administration of the park this is given as a feature of the development of the park for recreation. These reservations while small in area are usually islands or shoreline reservations where specimens can readily be seen by the canoe traveller.

Interest in Algonquin Park on the part of naturalists all over Canada will surely be intensified by the knowledge that such reservations exist there, and it is to be hoped that no stands of virgin timber will be delivered over to the axe without first having their merits as nature monuments given full consideration.

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VOL. LIV, No. 4

Museum of Comparative  
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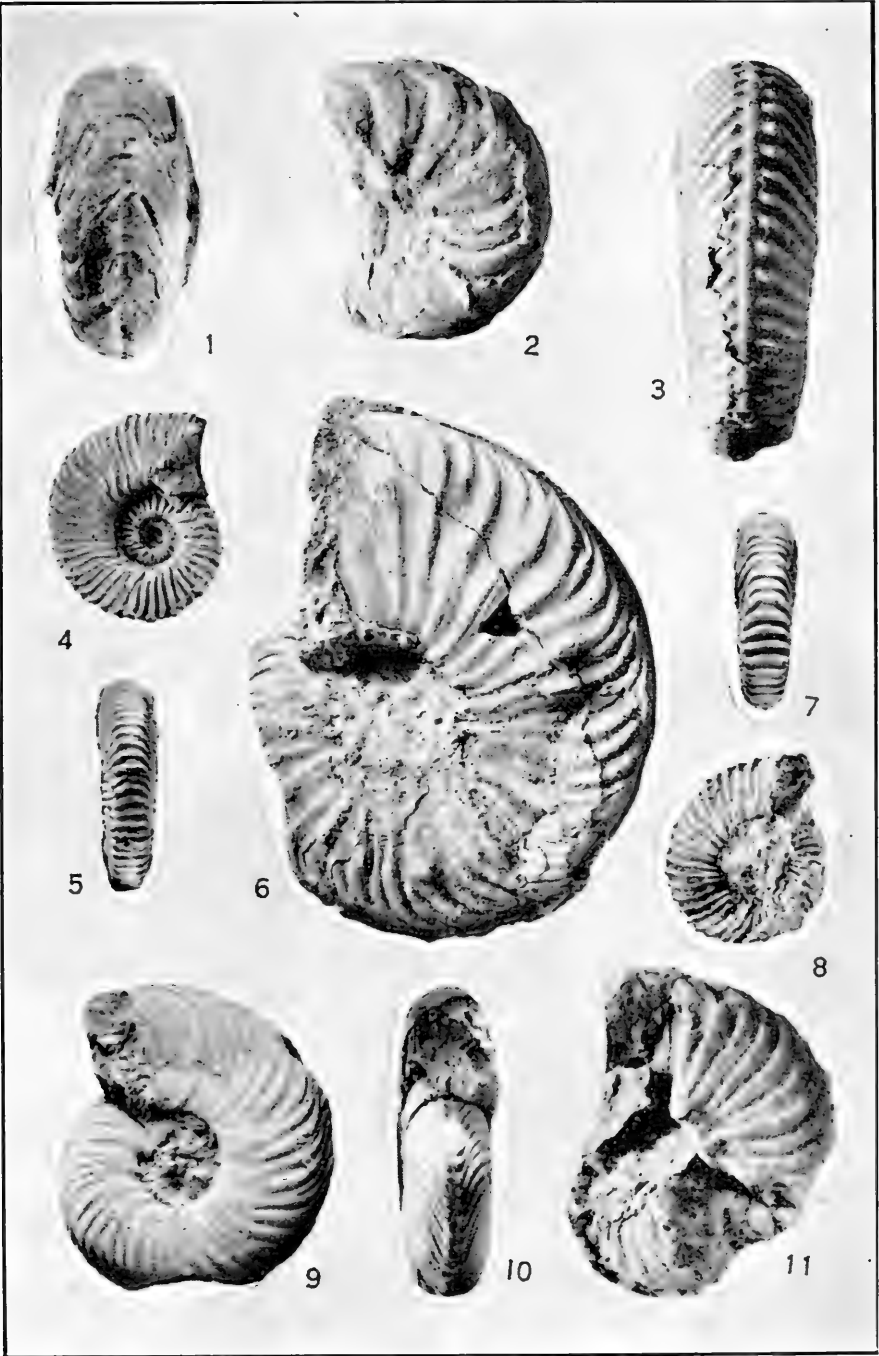


PLATE 2

# The Canadian Field-Naturalist

VOL. LIV

OTTAWA, CANADA, APRIL, 1940

No. 4

## NEW CANADIAN TRIASSIC AMMONOIDS\*

By F. H. McLEARN



FEW new species and varieties of ammonoids from the Triassic Schooler Creek formation are described in the following pages. *Asklepioceras glaciense* n. sp. and *A. laurenci* n. sp. are in the *Nathorstites* fauna. *Juvavites* (*Dimorphites*?) *pardonetiensis* n. sp., *Styrites columbianus* n. sp., *Styrites ireneanus* n. sp., *Buchites hilaris* var. *dawsoni* n. var., *Thisbites charybdis* var. *custi* n. var., and *T. charybdis* var. *ireneanus* n. var. are from the *Stikinoceras-Styrites* (or *Stikinoceras-Palicides*') fauna. *Juvavites magnus* n. sp. and *Juvavites biornatus* n. sp. are in what may be tentatively be called the *Drepanites* fauna. *Helicites decorus* n. sp., *H. decorus* var. *obesus* n. var. *H. decorus* var. *transitionis* n. var., *Daphnites* (*Phormedites*?) *stelcki* n. sp., and *Distichites doidli* var. *canadensis* n. var. are in the *Distichites* fauna.

Revised lists of ammonoids of the Schooler Creek formation, based on recent studies and descriptions of new species and varieties follow. The *Nathorstites* fauna includes *Isiculites schooleri*, *I. schooleri* var. *parvus*, *Lobites pacianus*, *Nathorstites* cf. *mcconnelli* Whiteaves, *N. cf. mcconnelli* var. *lenticularis* Whiteaves, *Sagenites gethingi*, *Nitanceras selwyni*, *Proarcestes* sp. *Silenticeras hatae*, *Sirenites meginiae*, *Protrachyceras sikanianum*, *P. zauwae*, *Asklepioceras glaciense* and *A. laurenci*. This fauna is correlated with the later Ladinian or early Karnian of Europe, that is late Mesotriassic or very early Neo-Triassic.

The *Stikinoceras-Styrites* (or *Stikinoceras Palicides*' fauna) includes *Juvavites bococki*, *J. cf. mackenzii*, *J. clavatus*, *J.?* cf. *carlottensis* Whiteaves, *J. (Anatomites) humi*, *J. (Griebachites)* sp., *J. (Dimorphites?) pardonetiensis*, *Tropites* sp., *Styrites columbianus*, *S. ireneanus*, *Sirenites nabeschi*, *Stikinoceras kerri*, *Buchites hilaris* var. *dawsoni*, *Thisbites charybdis* var. *ireneanus*

and *T. charybdis* var. *custi*. In addition the following, collected from talus, are thought to be of this fauna: *Juvavites mackenzii*, *J. mertoni*, *J. (Gonionotites) spiekeri*, *Malayites dawsoni*, *Discotropites* cf. *acutus* Mojsisovics, *Waldthausenites* sp., *Stikinoceras robustum*, '*Palicides*' and *Placites*. This fauna is correlated with the Karnian of Europe and is early Neo-Triassic.

In the westernmost part of the area studied a fauna similar in age to the above was collected with *Discotropites sandlingensis* Hauer and *Discotropites* cf. *formosus* Smith.

The *Drepanites* fauna includes a number of species tentatively grouped together. They do not all have exactly the range of the *Drepanites*, but they occur closely enough together stratigraphically to warrant a tentative assumption of their association as one fauna. They include *Juvavites magnus*, *J. biornatus*, *Drepanites rutherfordi*, *Cyrtopleurites magnificus*, *C. cf. bicrenatus* Hauer and *Pterotoceras caurinum* var. *elegantulum*. In addition *Pterotoceras caurinum* was collected from talus. It is possible that *Thisbites* cf. *meleagri* Mojsisovics belongs to this fauna. It is correlated with the Norian of Europe and is about middle Neo-Triassic time.

The somewhat later *Distichites* fauna contains *Parajuvavites* sp., *Isiculites browni*, *I. cf. smithi* Diener, '*Heracites*' cf. *ariciae* Mojsisovics, *Sirenites* cf. *elegantiformis* Diener, *Himavatites columbianus*, *Distichites* cf. *mesacanthus* Diener, *D. cf. megacanthus* Mojsisovics, *D. loidli* var. *canadensis*, *Helicites decorus*, *H. decorus* var. *obesus*, *H. decorus* var. *transitionis*, *Daphnites* (*Phormedites*?) *stelcki*, *Placites* and *Pinacoceras*. In addition the following were collected from talus: *Arcestes* sp., *Himavatites* cf. *watsoni* Diener and *Helicites* cf. *subgeniculatus* Mojsisovics. This fauna is compared with the Norian of Europe and is about middle Neo-Triassic age.

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The succeeding fauna with *Monotis subcircularis* Gabb can be compared with the later Nor-

ian of Europe. It includes the ammonoids *Diphyllites* and *Placites*.

The following descriptions are brief and preliminary, but are thought to be sufficient to establish the new species and varieties. More elaborate descriptions and adequate illustrations will be given in a report now in preparation.

*Juvavites magnus* n. sp.

Plate I, figure 8

This large species has higher than thick whorls, a narrowly arched venter at the posterior end of the ultimate whorl and a broadly arched venter at the anterior end, where there is a considerable expansion in the thickness of the whorl. The posterior part of the ultimate whorl is ornamented with relatively slender, but elevated, ribs, all of which bifurcate on the outer part of the sides and some divide near the umbilical shoulder. All ribs are arcuate and continuous across the venter. The ribs are stronger and farther apart on the anterior part of the ultimate whorl, and on the last quadrant the bifurcation is lost and both long and short, single ribs are highly elevated where they cross the ventral area.

This species is distinct from others of the *continui* group of *Juvavites* in the combined characters of compressed whorls expanding in thickness at the anterior end of the ultimate whorl, loss of bifurcation at the anterior end and elevated ribs. There is some resemblance to *Juvavites nepotis* var. *timorensis* Welter, in ornament and form, but the Timor species has the ribs interrupted on the venter.

Geological Survey collections; holotype, cat. no. 8837.

*Juvavites biornatus* n. sp.

Plate I, figure 11

The holotype is of moderate size, is compressed and involute, and has higher than thick whorls, somewhat flattened sides of the whorls, well rounded and not well-defined, ventral shoulders, arched, rather narrow, ventral area and narrow, rather deep umbilicus. The posterior half of the last whorl is ornamented with slender, elevated, bifurcating ribs which divide on the outer part of the sides and some, in addition, divide nearer the umbilical shoulder. The ribs are slightly curved on the sides, are bent forward a little near the ventral shoulder and continue across the venter, where they have the form of a low arch. In the last quadrant of the ultimate whorl, bifurcation is lost and there are long, fairly widely spaced, strong, elevated ribs and several, short, elevated

ribs between them. All specimens have approximately the general form of the holotype and the two styles of ribbing but there is considerable variation in thickness of whorl, in size and number of ribs and in the stage of growth at which the change in style of ribbing takes place.

There is some resemblance to the Alpine species *Juvavites senni* Mojsisovics, which, however, does not appear to have the second style of ribbing. Some species from Timor have the second style of ribbing, but they seem to have it exclusively and lack the first style, or they have two somewhat similar stages of ribbing, but differ in having more acutely arcuate ribbing across the venter or differ in proportions of the shell.

Geological Survey collections; holotype, cat. no. 8838.

*Juvavites (Dimorphites?) pardonetensis* n. sp.

Plate I, figure 13

This fairly compressed, involute species, has high, thin whorls, flattened or nearly flattened venter and rounded, ventral shoulders. The ribs are fine, rounded, slightly convex on the sides and bent forward near the ventral shoulder. There is a narrow, smooth band on the venter. This species has more slender and rounded ribs than the Alpine species *Dimorphites selectus* Mojsisovics and has rounded, not angular, ventral shoulders. It has more slender and more rounded ribs than the Sicilian species *Juvavites (Dimorphites) mariae* Gemmellaro.

Geological Survey collections; holotype, cat. no. 8833.

*Styrites columbianus* n. sp.

Plate I, figure 3

The holotype is a stout-whorled shell with thicker than high, inner whorls becoming relatively lower and thinner and about as high as thick anteriorly, that is there is whorl contraction and there is also some umbilical expansion. Other specimens have more slender whorls like those of the type specimen of the Sicilian species, *Styrites haugi* Gemmellaro. Compared with this species all the Peace River specimens have longer ribs on the ultimate whorl and some have more ribs per whorl.

Geological Survey collections; holotype, cat. no. 8827.

*Styrites ireneanus* n. sp.

Plate I, figures 1, 2

This is a very much compressed, fairly involute shell, with very thin, high whorls and a sharp venter surmounted by a small keel. Beyond

about 18 mm. diameter, the venter widens and flattens, definite ventral shoulders form, but the keel remains small. The surface is nearly smooth. Growth lines and some striae are nearly straight or slightly convex on the sides and strongly projected forward near the venter. This species is larger than the Alpine species, *Styrites altus* Mojsisovics and also differs in the widening and flattening of the ventral area at maturity.

Geological Survey collections; holotype, cat. no. 8826.

*Buchites hilaris* var. *dawsoni* n. var.

Plate I, figure 4, 5

In this variety are included moderately evolute shells with rounded whorls, about as high as thick and somewhat stouter than those of the Alpine species, *Buchites hilaris* Mojsisovics. The shells of this variety are also larger and have more ribs per whorl, about 45 in the holotype. The venter is at first smooth. Faint tubercles appear at the ends of the ribs and in some specimens a faint, hair-like line appears on the venter. Finally, in large specimens, the ribs cross the venter, although they are mostly reduced in relief there. This last stage of ventral ornament comes at a later stage of growth than in the typical species.

Geological Survey collections; holotype, cat. no. 8825.

*Thisbites charybdis* var. *custi* n. var.

Plate I, figures 6, 7

This is a moderately compressed moderately evolute shell, with higher than thick, fairly rounded whorls. The sides of the whorl are gently convex, the venter arched and the ventral shoulders well rounded. There is, in some specimens a faint, ventral elevation or poorly defined carina. The fine, approximate ribs are bent forward a little near the venter and end in slight swellings or carina.

Compared with the Sicilian species *Thisbites charybdis* Gemmellaro, this variety has more rounded, less compressed whorls and fainter and less well defined carina and tubercles. It is more compressed than *Buchites hilaris* var. *dawsoni* and has a better, if poorly, defined, ventral elevation on carina.

Geological Survey collections; holotype, cat. no. 8801.

*Thisbites charybdis* var. *ireneanus* n. var.

Plate I, figures 9, 10

This variety has flatter and more compressed whorls and better defined ventral shoulders than

var. *custi*. It is closer to the species than var. *custi*, but it has, like this variety, a poorly defined, ventral elevation or faint carina and only faint tubercles.

Geological Survey collections; holotype, cat. no. 8802; paratype, cat. no. 8791.

The generic position of the three foregoing forms, *Buchites hilaris* var. *dawsoni*, *Thisbites charybdis* var. *custi* and *Thisbites charybdis* var. *ireneanus* is not completely solved and the genera assigned are likely only tentative. They are so assigned because Mojsisovics and Gemmellaro have so placed the species of which they are assumed to be varieties. The three shells resemble one another and *T. charybdis custi* is somewhat intermediate between the other two. They all share the very moderate curvature of the ribs, the faint tubercles at the ends of the ribs, the tendency for a faint line or poorly defined carina to appear on the otherwise smooth venter and the tendency at maturity for the ribs to cross the venter, although mostly only faintly. The general outline of *B. hilaris dawsoni* suggests *Buchites*, but it is not a true *Buchites*. It is much smaller and does not develop the style of ventral ribbing of *Buchites*. The compressed form, ribbing, faint tuberculation and faint ventral carination of *T. charybdis custi* and *T. Charybdis ireneanus* are transitional toward *Thisbites*. But all lack the stronger tuberculation and better defined, although small, ventral carina or keel of typical *Thisbites*, that is of a *Thisbites* like *Thisbites agricola* Mojsisovics. Any generic revision will involve not only the foregoing varieties and species, but also several Sicilian species that Gemmellaro has included in *Buchites* and *Thisbites*.

*Helicites decorus* n. sp.

Plate II, figures 4, 5

This is a variable, compressed species with higher than thick whorls, rounded to abruptly rounded, ventral shoulders, flattened to slightly convex, convergent sides, flattened to somewhat rounded venter, fine and numerous ribs which are stiff to somewhat curved on the sides, curved forward on the outer part of the sides and slightly arcuate to nearly straight across the venter. There are no tubercles or knot-like swellings on the ventral shoulders, although in a few specimens, including the holotype, there is a slight elevation of the ribs on the ventral shoulder, in the anterior part of the ultimate whorl.

There is at least some superficial resemblance to the Timor species *Cycloceltites oppiani* Diener, which is not a true *Cycloceltites*, but *H. decorus*



seems to have flatter sides and venter, better defined ventral shoulders and ribs straighter across the venter and not so inclined on the sides.

Compared with typical *Helictites* our species is more compressed and lacks the tubercles or knot-like swellings on the ventral shoulder.

Geological Survey collections; holotype, cat. no. 8824.

*Helictites decorus* var. *obesus* n. var.

Plate I, figure 12

This variety has more rounded and less compressed whorls than the holotype. The whorls are nearly as thick as high, to as thick as high. Venter and ventral shoulder are well rounded, but the sides are somewhat flattened. The ribs are thick, most so on the venter, are stiffer on the sides of the whorl than in the typical species and are arcuate across the venter. As in the typical species, both the ribs and the spaces between them are covered with fine, even striae.

This variety shows considerable resemblance to a specimen from Timor figured as *Helictites mojsvari* by Diener (1923, pl. 12, figs. 5a, b.) This does not mean that it is close to *H. Mojsvari* for the type of that species should be the very different specimen figured by Diener (1906, p. 17, pl. 8, figs. 15a-c) from India. Diener included both the Timor and Indian specimens in this species when he described it, but the Indian specimen corresponds the more closely to the original description.

This is the variety that departs the most from typical *Helictites* and the genotype, *Helictites geniculatus* Hauer, in rounding of whorl, absence of tubercles on the ventral shoulder and degree of arcuation across the venter. It is smaller than, less robust than and lacks the umbilical tubercles of *Helictites sundaicus* Diener from Timor.

Geological Survey collections; holotype, cat. no. 8822.

*Helictites decorus* var. *transitionis* n. var.

Plate II, figures 7, 8

Compared with the typical species, this variety has lower, less compressed and stouter whorls, flatter venter and fewer ribs which are stiffer on the sides, more nearly straight across the venter and more highly elevated on the ventral shoulder. The whorls are almost as thick as high. Thus this is the variety that approaches the more closely to typical *Helictites*. It is not close enough, however, to have a tubercle or knot-like swelling on the ventral shoulder. The whorls are a little more compressed than those of the Indian species

*Helictites mojsvari* Diener and there are no knot-like swellings on the ventral shoulder.

Geological Survey collections; holotype, cat. no. 8823.

*Daphnites* (*Phormedites*?) *stelcki* n. sp.

Plate II, figures 9, 10

This is a large, compressed, moderately evolute species with somewhat flattened whorls, as high as thick to higher than thick. There is a flat or very shallow, sulcate, smooth band on the venter. The ribs are strongly projected forward near the venter and end in low clavi or tubercles on the border of the ventral smooth band. In some specimens there are also narrow, discontinuous carinae bordering the ventral, smooth band. At maturity the ribs cross the venter, where they are low and broad and are separated by broad shallow furrows. There is an early stage of ornament, ending on the posterior part of the ultimate whorl, where flat, triangular or bluntly pointed bul-  
lae are situated on the umbilical shoulder and give origin to several ribs. The mature ventral ornament resembles that of a *Phormedites*, the ventral, smooth, shallow band resembles that of a *Daphnites*. It is larger than the Alpine *Daphnites berchtae* Mojsisovics, has fewer and larger costae, has a more shallow, ventral furrow or even merely a flat, smooth band. Where marginal carinae are present they are discontinuous and partly replaced by low tubercles or clavi. Moreover in the adult stage the ribs cross the venter. It is of course quite different from a *Daphnites* like *D. ungeri* Mojsisovics, with its deep, ventral furrow.

Geological Survey collections; holotype, cat. no. 8832.

*Distichites loidli* var. *canadensis* n. var.

Plate II, figure 6

This is a compressed, moderately involute shell, with a higher than thick ultimate whorl. The narrow, ventral sulcus is bordered by narrow keels. The ornament differs from that of the Alpine species *Distichites loidli* Mojsisovics in having two instead of three rows of lateral tubercles, in having one of these, the umbilical row, weaker and in having the outer row stronger than the outermost row of *D. loidli*. It is also not so involute as the typical species. The ribs are not so broad as in the Timor species, *Distichites tropicus* Diener and it has a weaker umbilical and a stronger, outer row of tubercles.

Geological Survey collections; holotype, cat. no. 8816.



*Asklepioceras glaciense* n. sp.

## Plate II, figure 11

This is relatively large, robust, fairly involute species. The whorls are stout, have somewhat flattened, convergent sides, broad, flatly rounded venter and rounded, ventral shoulders. The ventral sulcus, beginning near the posterior end of the ultimate whorl, deepens on the anterior part of this whorl. The sides are ornamented with numerous, even, flat, band-like to somewhat convex ribs, separated by deep, narrow sulci, recording evenly spaced ridges on the inside of the shell. The sulci and ribs bend forward on the ventral shoulder and extend to the ventral sulcus. There is a variable number of rows of small tubercles on the sides of the whorl and two or three rows of clavi next to the ventral sulcus. Some ribs end in a small bulla on the umbilical shoulder. The suture line is poorly preserved. ES, however, is entire.

The form is similar to that of the Grecian and Anatolian species, *Asklepioceras helenae* Renz, but the sulci and internal ridges are more evenly and closely spaced. The tubercles persist to the anterior end of the shell.

Geological Survey collections; holotype, cat. no. 8808.

*Asklepioceras laurenci* n. sp.

## Plate II, figures 1, 2

This is a stout-whorled, fairly involute species with whorls about as high as thick. The sides of the whorl are almost flat and convergent, the venter wide and flatly arched and the ventral shoulders rounded. Deep sulci are fairly evenly spaced and projected forward on the ventral shoulder and some cross the ventral sulcus. The sulci set off wide, flat bands, somewhat narrowed and somewhat pointed or narrowly rounded at their inner ends, on the umbilical shoulder. These bands are covered with fairly even varices of growth.

This species bears no tubercles like *Asklepioceras helenae* Renz and the ornament is more like that of the Alpine species *Asklepioceras segmentatus* Mojsisovics, from which it differs in having thicker and stouter whorls and smaller umbilicus.

Geological Survey collections; holotype, cat. no. 8805.

## DESCRIPTION OF PLATES

## PLATE I

Figure 1 *Styrites ireneanus* n. sp. Ventral view. Holotype. Geol. Surv. colls., cat. no. 8826.

Figure 2 Same specimen. Side view.

Figure 3 *Styrites columbianus* n. sp. Side view. Holotype. Geol. Surv. colls., cat. no. 8827.

Figure 4 *Buchites hilaris* var. *dawsoni* n. var. Side view. Holotype. Geol. Surv. colls., cat. no. 8825.

Figure 5 Same specimen. Apertural view.

Figure 6 *Thisbites charybdis* var. *custi* n. var. Side view. Holotype. Geol. Surv. colls., cat. no. 8801.

Figure 7 Same specimen. Apertural view.

Figure 8 *Juvavites magnus* n. sp. Side view. Holotype. Geol. Surv. colls., cat. no. 8837.

Figure 9 *Thisbites charybdis* var. *ireneanus* n. var. Side view. Holotype. Geol. Surv. colls., cat. no. 8802.

Figure 10 Same specimen. Apertural view.

Figure 11 *Juvavites biornatus* n. sp. Side view. Holotype. Geol. Surv. colls., cat. no. 8838.

Figure 12 *Helictites decorus* var. *obesus* n. var. Side view. Holotype. Geol. Surv. colls., cat. no. 8822.

Figure 13 *Juvavites* (*Dimorphites*?) *pardonetien-sis* n. sp. Side view. Holotype. Geol. Surv. colls., cat. no. 8833.

## PLATE II

Figure 1 *Asklepioceras laurenci* n. sp. Ventral view. Holotype. Geol. Surv. colls., cat. no. 8805.

Figure 2 Same specimen. Side view.

Figure 3 *Thisbites charybdis* var. *ireneanus* n. var. X 4. Ventral view. Paratype. Geol. Surv. colls., cat. no. 8791.

Figure 4 *Helictites decorus* n. sp. Side view. Holotype. Geol. Surv. colls., cat. no. 8824.

Figure 5 Same specimen. Ventral view.

Figure 6 *Distichites loidli* var. *canadensis* n. var. Side view. Holotype. Geol. Surv. colls., cat. no. 8816.

Figure 7 *Helictites decorus* var. *transitionis* n. var. Ventral view. Holotype. Geol. Surv. colls., cat. no. 8823.

Figure 8 Same specimen. Side view.

Figure 9 *Daphnites* (*Phormedites*?) *stelcki* n. sp., Side view. Holotype. Geol. Surv. colls., cat. no. 8832.

Figure 10 Same specimen. Apertural view.

Figure 11 *Asklepioceras glaciense* n. sp. Side view. Holotype. Geol. Surv. colls., cat. no. 8808.

## **BIRDS OBSERVED AT CHURCHILL, MANITOBA, SPRING AND SUMMER 1938**

**By FRANK L. FARLEY**

**T**HE SPRING MIGRATION of birds at Churchill was well advanced when Albert L. Wilk and the writer reached the port, May 28th, 1938. On the 29th a careful investigation of the area immediately south and east of the town was carried out, and a ten-mile walk resulted in a list of 30 species being secured. During the last two days of the month this list was increased to 42. Some of these were, without doubt, new arrivals, and it was assumed that many of the birds observed for the first time after June 1st, could also be considered as such.

Records of migrations obtained at Churchill during the past eight years have demonstrated that certain birds arrive in that northern latitude with the same degree of regularity as is noted in more southern climes. This is particularly so with species whose northern limit of distribution coincides with the limits of tree growth. The Yellow Warbler (*Dendroica aestiva*) is outstanding in this class. Few other birds are more consistently recorded at the actual time of their arrival than this species. Its confiding ways, striking colour, and above all its spirited song, make

it easy to recognise, and it is usually detected on the day, or even the hour of its coming. Our records show that the Yellow Warbler made its first appearance at Churchill in the four years, 1935 to 1938, both inclusive, as follows; June 12, June 14, June 10 and June 9, an average date of approximately June 12. I have the spring records of arrival of this species at St. Thomas, Ontario, taken nearly fifty years ago. These are for the years 1888 to 1891, both inclusive. They are as follows; April 29, April 30, April 30, and April 28, an average date of approximately April 29. Should the Yellow Warblers that spend the summer at Churchill, reach that point by way of Ontario, Michigan and James Bay, a journey of at least 1,500 air-miles would be necessary on this lap of their northern migration. It may be, however, that the Mississippi flyway is used which would offer a more direct route. Banding birds on a large scale in the north will some day reveal the facts.

List of birds observed at Churchill during the spring and summer of 1938, with date of first appearance, and number of individuals noted. Birds listed in order of their occurrence.



**COMPASS TREES**

*Isolated spruces on the wind-swept tundra grow most of their branches on the south side of the trunk, one of the most dependable signs of direction provided by nature. Many such trees are found in the Churchill country*

1938

May 29—

American Rough-legged Hawk .....	6
Hudsonian Godwit .....	4
Bonaparte's Gull .....	10
Snow Bunting .....	12
Lapland Longspur .....	25
White-crowned Sparrow .....	10
Harris's Sparrow .....	12
White-rumped Sandpiper .....	20
Tree Sparrow .....	8
American Pipit .....	1
Savannah Sparrow .....	5
Least Sandpiper .....	5
Semipalmated Sandpiper .....	20
Semipalmated Plover .....	6
Herring Gull .....	6
Horned Lark .....	20
Common Redpoll .....	10
Robin .....	6
Killdeer .....	2
Old Squaw .....	10
Pintail .....	16
Mallard .....	20
Canada Goose .....	2
Greater Scaup .....	20
Stilt Sandpiper .....	20
Dowitcher .....	15
Northern Phalarope .....	50
Short-eared Owl .....	1
Willow Ptarmigan .....	50
Pigeon Hawk .....	2
Arctic Loon .....	2

May 30—

Hudsonian Curlew .....	10
Golden Plover .....	1
Parasitic Jaeger .....	1
American Bittern .....	1
Lesser Yellowlegs .....	25
Red-backed Sandpiper .....	1
Marsh Hawk .....	1
Baldpate .....	3
Wilson Snipe .....	1

May 31—

Duck Hawk .....	1
Gray-cheeked Thrush .....	5
Arctic Tern .....	20
Red-breasted Merganser .....	6

June 1—

Fox Sparrow .....	1
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Junco .....	2
Rusty Blackbird .....	2
Smith's Longspur .....	2
Northern Flicker .....	1

June 2—

Black Duck .....	5
Orange-crowned Warbler .....	1

June 4—

Canada Jay .....	6
Ruby-crowned Kinglet .....	1
Ruddy Turnstone .....	2

June 6—

Green-winged Teal .....	1
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June 7—

Grebe sp.? .....	1
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June 8—

Whistling Swan .....	14
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June 9—

Crow .....	1
Northern Water-Thrush .....	1
Yellow Warbler .....	1

June 10—

Tree Swallow .....	3
Sora Rail .....	2

June 11—

American Knot .....	2
Lincoln's Sparrow .....	1

June 13—

Shoveller .....	2
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June 14—

White-winged Scoter .....	9
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June 18—

Eastern Phoebe .....	1
American Golden-eye .....	1

June 20—

Tennessee Warbler .....	3
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June 22—

Blue-winged Teal .....	2
Bronzed Grackle .....	2
Solitary Sandpiper .....	1
Spotted Sandpiper .....	2

July 1—

White-rumped Shrike .....	1
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July 7—

Red-winged Blackbird .....	2
Raven .....	

# MISCELLANEOUS CONTRIBUTIONS FROM THE NATIONAL HERBARIUM OF CANADA, NO. I\*

By A. E. PORSILD

***Radiola linoides* Roth.; *Millegrana Radiola* (L.) Druce.**—The first, and as far as the writer knows, the only previous American record of *Radiola*<sup>1-2</sup> is based upon a single collection from Cape Breton Island, Nova Scotia: Louisburg, along a ditch, August 18, 1898, John Macoun, No. 20232 (G; CAN)<sup>3</sup>. Gray's Manual and Britton and Brown both record it as introduced from Europe.

Specimens of what proves to be this tiny flax or all-seed from several new stations have recently been received from Miss Margaret S. Brown of Halifax, N.S., who collected well-developed, fruiting specimens on damp soil, near the sea at Green Bay, Halifax County, Nova Scotia, September 26, 1928 (CAN), and also at Ship Harbour, Cole Harbour and East Dover, all in Halifax County, August 15, 1924. *Radiola linoides* is otherwise known from Europe, Northern Africa, Western Asia and the island of Madeira.

***Myriophyllum pinnatum* (Walt.) B.S.P.; *M. scabratum* Michx.**—Small fruiting specimens of what proves to be this warm-temperate species, not previously known from Canada, have recently been received from Saskatchewan.

The specimens were collected in July, 1930, by Mr. E. T. Reeder, in a small slough in wet soil with *Callitriche verna*, *Ranunculus trichophyllus* and *Elatine americana*, near Wordsworth, ten miles S.W. of Carlyle in S.E. Saskatchewan.

According to Rydberg<sup>4</sup>, *Myriophyllum pinnatum* is known otherwise from Rhode Island south to Florida, west to North Dakota, Texas, and south to Mexico and Central America. Mr. Reeder's new station in Saskatchewan is thus a very considerable extension of range.

***Conimitella Williamsii* (D. C. Eaton) Rydb., in N. Am. Fl. 22, 2:97 (1905); *Heuchera Williamsii* D. C. Eaton, Bot. Gaz. 15: 61 (1890); *Tellima nudicaulis* Greene, Pittonia 2:162 (1891); *Lithophragma Williamsii* (D. C. Eaton) Greene, Erythea 3:102 (1895).**

\*Published by permission of the Director, Mines and Geology Branch, Department of Mines and Resources, Ottawa.

1. Gray's Manual, ed. 7:532 (1908)

2. Britton & Brown, Illustr. Flora, Ed. 2, 2:440 (1913)

3. (G)—Gray Herbarium, Cambridge, Mass.; (CAN)—National Herbarium of Canada.

4. Flora of Prairies and Plains, 583 (1932)

Of this little-known species, otherwise known from mountains of Montana, Idaho and Wyoming, there are two sheets of beautifully preserved specimens in the National Herbarium of Canada, collected by W. D. Cram, in the Crow's Nest forest Reserve, Alberta, June 22, and July 10, 1920. No. 102,826 and No. 102,783 (CAN). Both specimens are in flower, with young immature fruit. The species is new to the flora of Canada.

***Cystopteris montana* (Lam.) Bernh.—**

John Macoun<sup>5</sup> correctly wrote of this species as "one of our rarest ferns." Since it was first recorded from North America, from Rocky Mountains lat. 52°-56° (Hooker, Fl. Bor.-Am.) more than a century ago less than a dozen new stations have been added from Canada and, as far as the writer is aware, but two new Canadian stations have been recorded since Macoun published his Catalogue,<sup>6</sup> when the species was known from the Strait of Belle Isle, Gaspé, Lake Mistassini, from north of Lake Superior near Current River, Yellow Head Pass and Kicking Horse Pass in British Columbia.

Collections from two new Canadian stations have recently come to hand. One is from the Yukon Territory: North Fork of the Klondike River, in shaded woods, 2000 feet elevation, July 18, 1919, W. E. Cockfield. The other is from the Northwest Territories: Liard River, between Nahanni Butte and Simpson, June 21-25, 1922, C. H. Crickmay. (Both CAN).

In America *C. montana* is known otherwise from Colorado, from a few stations in Alaska<sup>7</sup> and from one station in Greenland. In addition it is known from mountains of Europe and Asia.

***Lycopodium obscurum* L. var. *dendroideum* (Michx.) D. C. Eaton.**—Yukon Territory: Near the Arctic Circle, in longitude 141° W. 1912. D. D. Cairnes.

Although Hultén<sup>8</sup> cites an unverified record from the Klondike the above appears to be the first authentic collection from Yukon Territory.

5. Catalogue of Canadian Plants 5:290, (1890)

6. Britton & Rydberg, Bull. N.Y. Bot. Gard. 2:149 (1901), from Klondike-Indian Divide, Y.T. and Raup, Contr. Arnold Arb. 6:113 (1934) from Lesser Slave Lake, Alta.

7. Porsild, A. E., Rhodora 41:171 (1939).

8. Fl. Aleut. Isl.

***Aphragmus Eschscholtzianus*** Andr.—Of this very rare plant, for more than a century known only from one island in the Aleutian chain, and but recently recorded from the mainland of North America<sup>9</sup> there is a well-developed, fruiting specimen in the Gray Herbarium, Harvard Uni-

versity, Cambridge, Mass., collected in Canada. This plant was taken in the southwestern corner of the Yukon Territory, between Lake Kluane and the Donjek River, by A. Müller, August 11-22, 1920. It is new to the flora of Canada.

9. Porsild, A. E., *Rhodora*, 41:232 (1939).

## KEEPING TRACK OF BATS

By HAROLD B. HITCHCOCK



THE LITTLE BROWN BAT, *Myotis l. lucifugus*, and the big brown bat, *Eptesicus f. fuscus*, are common in Ontario from early May to late August or early September. During this period the females may make a nuisance of themselves by congregating in large maternity colonies where their squeakings, scratchings, and droppings may annoy the human occupants of the buildings they have chosen for their summer abode. Almost any structure providing darkness, warmth from the sun, and protection from wind and rain may shelter a colony. The hotter and stuffier the place is the better bats seem to like it. Of eight Ontario colonies of *Myotis* visited during the summer of 1939 three were in occupied dwellings, one in an unoccupied dwelling, three in churches, and one in a school. The only colony of *Eptesicus* located was in a church which also sheltered many *Myotis*, but each species had its own attic, and never was an *Eptesicus* found in the *Myotis* attic, or vice versa. Contrary to the popular concept of "bats in the belfry" church bats more frequently retire to the stygian gloom of the attic, leaving the brighter and better ventilated belfry to the starlings and pigeons. Even in the attic most of the bats do not remain exposed, but crawl behind boards, get between the walls, or squeeze between the ridge-pole and the roofing.

How about the males? That they shun female companionship in crowded, stuffy maternity centers is demonstrated by the fact that of the 431 adult *Myotis* caught in Ontario colonies from July 27 to August 31, 1939, only two were males. A few instances where adult males were found near colonies furnish clues to their habits. At Bala, Ontario, two solitary males were discovered near a colony where on the fifth of August 498 bats were seen emerging. One was in a pile of lumber, and the other was behind the flashing on a chimney of a cottage on the opposite shore of the lake. Accumulated droppings at the cottage indicated

that this retreat had been in use for some time. In fact Messrs. Jack and Douglas Bocking caught a male there in the latter part of August, 1938. That year four bats used this place regularly, but the sex of only one was determined. At Lake Memphremagog, Quebec, on July 8, 1939, a solitary male was found in a boathouse a few rods from a colony. Droppings indicated that this retreat was in regular use.

During the colder months of the year an occasional bat may alarm the occupants of a dwelling by flying around in the attic or basement. City churches in which heat is kept on throughout the week usually have a service or two disrupted when the organ music or perhaps the extra heat interrupts the winter slumbers of a bat. *Eptesicus* is usually the villain, but even with this species the natural winter habitat is believed to be in caves which remain above freezing. Since Middlesex and Kent counties, Ontario, where most of the bats were studied, are without caves, there is probably some migration. It is known that fall migration is not necessarily in a southerly direction. Griffin (1940), for instance, reports finding four *Myotis* which had flown northwest 168 miles from a summer colony on Cape Cod to hibernate in a Vermont cave. Whether bats from southwestern Ontario hibernate in the United States or find shelter in Canada, perchance in the Niagara escarpment, is not yet known.

Banding is being employed in studying this question of summer-winter distribution of bats. During the summer of 1939, 738 *Myotis* and 11 *Eptesicus* were marked in Ontario and Quebec with bands supplied by the Biological Survey. This method of keeping track of bats, first employed by Allen (1921), has been utilized most extensively by Griffin, who has banded about 13,000 in New England and New York since 1932.

The greatest problem in bat banding is to catch the bats. Local conditions determine the

method. At some colonies the easiest way is to work inside the building during the day, clambering over dung-covered rafters in dark, oven-like attics. The bats are picked from roofboards and beams by hand, extracted from crevices with forceps, and caught in mid-air by net. At other colonies they are more easily captured in traps as they leave the building at dusk. The traps, cylindrical containers of wire screening fitted with a funnel-like opening through which a bat can drop but not crawl out, are placed below the exit holes. Since the holes are of various sizes and shapes, and in a variety of locations, setting a trap is sometimes a problem, but with the aid of mosquito netting an escape-proof arrangement can usually be effected. Good catches can be made by placing traps at the busiest exits and blocking the others, though it is often impossible to discover all the chinks through which bats leave a building.

In winter the greatest difficulties in collecting are finding where the likely caves are and then getting to them. Travel becomes imperative. Two expeditions were made during the fall of 1939, and one has been made so far in 1940.

On October 28, 1939, a search of several caves on Flowerpot Island at the tip of the Bruce Peninsula produced two unbanded male *Myotis l. lucifugus*. The following day caves near Wiarton, Bruce County, were explored and two bats found. Both were males of the species *Myotis keenii septentrionalis*, the long-eared little brown bat, previously unreported hibernating in Ontario. All but one of the caves visited in the Bruce country were on the face of cliffs a short distance from the shore. Most were shallow and probably too exposed to remain warm throughout the winter.

On November 25, 1939, the Lafleche Cave at Wilson's Corners, Quebec, was visited. The sizeable cavern, about 18 miles from Ottawa, is operated as a tourist attraction. In it were found 23 *Eptesicus*, 5 *Myotis l. lucifugus*, and 17 *Myotis keenii septentrionalis*. None had been banded. The big brown bats were all in a restricted area near the entrance, most of them packed together in a large cluster. A nearby thermometer about half way between floor and ceiling registered 36°F. The other bats were found singly or wedged two or three together into crevices. According to the proprietor, Mr. Zephir Lafleche, their number fluctuates from year to year, there usually being more than were seen on our visit.

It is known that some species of bats follow bird migration routes. Saunders (1930) reported finding red bats, one hoary bat and one silver gray bat among birds killed at the Long Point, Ontario, lighthouse in the fall of 1929. No record is known of *Myotis* or *Eptesicus* following bird routes, but it was hoped that if they cross Lake Erie via the Pelee Island route some would be recovered in the Ohio caverns on South Bass Island and mainland nearby. On January 1, 1940, Crystal Rock Cave on the shore of Sandusky Bay was visited, and on the following day several caverns on South Bass Island. Only 19 bats were found: 7 *Myotis l. lucifugus* (all males), 4 *Eptesicus*, and 8 *Pipistrellus subflavus obscurus*, a small bat recorded but twice in Ontario (at Ottawa, July 10, 1890, by W. E. Saunders (1920) and at Niagara-on-the-Lake in May 1933, by Downing (1938)). None of these bats had been banded. If bats from Ontario do follow the Pelee route, they apparently pass by the first suitable caves in favor of others farther along.

Banding operations will be continued and, if possible, extended during the coming year. Any information regarding colonies and caves, particularly caves in Ontario, will be appreciated. Persons finding banded bats are urged to report the band number, together with date and place of capture, to the National Parks Bureau, Department of Mines and Resources, Ottawa, or to the Biological Survey, Washington, D.C. Caution must be exercised in reading numbers on bat bands because the skin sometimes grows over the ends of the band, obscuring figures. If the bat is dead, the band can easily be removed by inserting scissor points and spreading them.

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TEST OF A METHOD OF SMALL MAMMAL TRAPPING

By D. A. MacLULICH

**V**ARIOUS arrangements of traps in quadrats and lines have been used to gain comparative indices of abundance of small mammals, see papers by Bole (1939), Dice (1931 and 1938) and others. In the present experiment it was desired to test the plan of crowding traps closely so that it would be unlikely that any small mammals should escape capture.

*Method.*—Ordinary break-back mouse traps were placed at 8-inch intervals, i.e. 3 per 2 feet, around the four sides of a quadrat measuring one rod or 16½ feet square. Four rows of similarly spaced traps were set across the quadrat near one side, the distance between rows being one foot. As there were not sufficient traps available to cover the area at one time the four rows were moved across the quadrat in barrage fashion. The number of traps in use was 192 and traps were set in 396 places altogether. All traps were anchored to sticks, etc., by tie-strings. For bait a mixture of rolled oats, peanut butter, raisins and bacon was used.

Trapping was carried out on a quadrat of the above description in 1933, June 11 to 21, and the next year the same area was trapped in the same way, July 9 to 18. The location was near Frank's Bay on the south shore of Lake Nipissing in Parry Sound District, Ontario.

The forest was mixed second-growth, consisting of poplar, white birch, balsam, white pine, red pine and white spruce in order of abundance, with *Aster macrophyllus* and *Aralia nudicaulis* prominent in the ground cover. The diameter of the dominant trees varied from 6 to 11 inches.

TABLE 1

Species	1933		1934	
	First 2 days	Total	First 2 days	Total
<i>Peromyscus maniculatus</i>	2	4	6	10
<i>Clethrionomys gapperi</i>	0	1	0	2
<i>Blarina brevicauda</i> .....	0	1	0	0
<i>Sorex cinereus</i> .....	1	2	0	0

Table 1. Mammals caught in a square rod quadrat.

*Results.*—The species and numbers caught are shown in Table 1, in which are indicated the catch of the first two days and the total for the whole period of trapping. In Table 2 the total numbers of animals caught daily for both years is shown.

TABLE 2

Days	Year 1933	Year 1934
1st.	1	2
2nd.	2	4
3rd.	0	2
4th.	2	2
5th.	1	2
6th.	0	1
7th.	0	0
8th.	0	0
9th.	0	0
10th.	1	—
Totals	7	13

Table 2. Total numbers of mammals caught. Trap spacing 8 x 12 inches on quadrat 1 rod square.

The animals caught on the boundary of the quadrat were, in 1933, 2 deermice, *Peromyscus maniculatus*, and 1 cinereous shrew, *Sorex cinereus*; and in 1934, 9 deermice and 1 red-backed mouse, *Clethrionomys gapperi*.

*Discussion.*—It is at once evident from the results presented in Tables 1 and 2, that this method yields a small and irregular sample and hence an inaccurate index of population changes. The sample is not large enough to represent even one family of an abundant species. The method requires too much labour and time. To enlarge the area of the quadrat (it was 1/160th of an acre) would use an impractical number of traps and excessive expenditure of time. For the same effort considerably more information could surely be obtained by spreading the traps over a larger area. Since mice explore their home range and will find traps even if only three or four are on their feeding ground it is not necessary to crowd traps so closely.

The trapping carried out in this experiment yielded some incidental information on the abundance of animals which is summarized in Conclusions 3a and 3b below.

*Summary and Conclusions.*—1. A plan of crowding break-back mouse traps 8 inches apart in rows

spaced 1 foot apart on a rod square quadrat was tried in two successive years.

2. The method required too much labour and gave inadequate and irregular data. It is recommended that traps be spaced much farther apart on larger trapping areas.

3. The numbers of animals caught suggest the following conclusions regarding the abundance of various animals on the south shore of Lake Nipissing in mixed second-growth: (a) Deermice, *Peromyscus maniculatus*, were more abundant in 1934 than in 1933. (b) Red-backed mice, *Clethrionomys gapperi*, short-tailed shrew, *Blarina brev-*

*icauda*, and cinereous shrew, *Sorex cinereus*, were present but not abundant.

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### NOTES AND OBSERVATIONS

*Chenopodium polyspermum* L. IN CANADA.\*—Since the publication in *The Canadian Field-Naturalist* for March, 1936, of a record of occurrence at Ottawa of *Chenopodium polyspermum* L., that and previous records from the Province of Quebec have been added to by both eastern and western extensions of range. From the herbarium of the Division of Botany, Science Service, Ottawa, the following citations may now be made.

*New Brunswick*: St. Andrews, H. Groh, July 31, 1936.

*Quebec*: Ste. Therese, Iberville Co., Fr. Marie-Anselm, August 30, 1934.

*Ontario*: Ottawa, Rockcliffe Park, H. Groh and W. G. Dore, August 10, 1935, open woods.

*Saskatchewan*: 15 miles S.W. of McKague, in garden, A. J. Breitung 479, August 27, 1939.

This weed, which may be known as many-seeded goosefoot, is a slender annual, adventive from Europe. A specimen collected from ballast at Camden, N.J., in 1879, is in the National Herbarium at Ottawa. Earlier records are mostly from Atlantic ports.—H. GROH.

\*Contribution No. 616, Division of Botany and Plant Pathology, Science Service, Dominion Department of Agriculture, Ottawa, Canada.

PINTAIL INCREASING AS NESTING BIRD IN NEW BRUNSWICK.—The first record of a Pintail (*Dafla acuta tzitzihua*) nest in the Province of New Brunswick was obtained when an incubating female was flushed from a nest of ten eggs in a small marsh near Midgic, Westmoreland County, New Brunswick, on June 6, 1938, by John Tingley. On May 20, 1938, I had suspected that this species

nested there when I observed six mated pairs feeding in a nearby flooded hayfield. A careful search on May 28 failed to disclose any nest, so the aid of John Tingley, game warden, was enlisted through the interest and co-operation of H. H. Ritchie, chief game warden of the Province. We believe that the six pairs of Pintails nested there during 1938.

In 1939 Mr. Tingley was again assigned to searching for Pintail nests and succeeded in finding five, all in approximately the same area as the one found in 1938. We saw as many as 21 pairs of Pintails there during the latter part of May, 1939, so believe that probably 20 or more pairs nested, a good increase over 1938.

Upon inquiry among local residents we learned from a farmer, who seemed perfectly reliable and who identified the birds as recent additions to his neighborhood, that one pair of Pintails nested in the Midgic area during 1937. This must have been the beginning of Pintail nesting in this part of New Brunswick.<sup>1</sup> From this one pair in 1937 the nesting population increased to six pairs in 1938 and to about 20 pairs in 1939. The small boggy marsh near Midgic is a part of the vast Tantramar marsh and hayfield area lying near the border of New Brunswick and Nova Scotia. It will be interesting to follow the nesting Pintail population there in the future as it may represent an important addition to the Atlantic Flyway waterfowl.—HAROLD S. PETERS, *U.S. Biological Survey, Charleston, S.C.*

1. Chamberlain (Bull. Nat. Hist. Soc. of N.B., 1882, pp. 23-68) records a female and brood of young on the Tobique river, Sept. 1879, seen by Mr. Carnell. No Pintail nesting records are known for New Brunswick from 1879 to 1937.



FLICKER AND STARLING TAKEN TOGETHER IN SAME NEST.—Page 59 of *The Canadian Field-Naturalist* for April, 1939, contains a reference by Mr. William W. Lott, a bird bander of London, Ontario, about a female Flicker he observed tending a brood of three young Starlings on May 24, 1938.

Just before dusk on the evening of June 1, 1939, in the vicinity of Ottawa, Ontario, the writer captured an adult male Yellow-shafted Flicker (*Colaptes auratus*) in a typical Flicker nesting cavity in a telephone pole, and in the same hole nestled underneath the Flicker was an adult Starling (*Sturnus vulgaris*). I marked these birds with bands Nos. 38-355008 and 39-209175 respectively. Apparently both birds were intending to share the nest for the night.

No eggs or young were found in the nest which probably was an old one that had been occupied by Starlings the previous season. Several visits to the nest were made afterwards and no eggs or young were found, but on June 16, 1939, I caught another adult Starling in it and banded the bird with No. 39-235101. No eggs or young were found on this or subsequent visits.

During May and June, 1939, practically all nesting sites suitable for Flickers that I found in this vicinity were occupied by Starlings.

As to banding Starlings, banders may never again have an opportunity of studying a species that offers so many interesting problems for investigation as does the Starling in its present status as an introduced species.—T. S. HENNESSY.

TWO RARE ORCHIDS IN THUNDER BAY DISTRICT.—The present report on these two orchids differs from the majority of records in the fact that neither of them is a new species for the Province of Ontario nor even the District of Thunder Bay. Owing to their rarity, however, I believe their re-discovery in 1939 is worthy of being brought to the attention of interested naturalists.

On July 8, near Grassy Lake, in the Sibley Peninsula, the writer found a small orchid which was later identified by Mr. Frank Morris as the Auricled Twayblade (*Listera auriculata* Wiegand). Mr. Morris had discovered this orchid at Grassy Lake many years ago to establish the first station for the species in Ontario. (Morris, F. and Eames, E. A. *Our Wild Orchids*.)

In August, I had the opportunity of examining another small orchid which had been collected by

Col. Milton Francis, Port Arthur, on July 29, near Pass Lake, also in the Sibley Peninsula and some 20 miles from Grassy Lake. This proved to be a specimen of the very rare Bog Adder's Mouth (*Malaxis paludosa* (L.) Sw.). This species had previously been found in Ontario on two occasions, both in the Sibley Peninsula but 20 miles or more from where it was found by Col. Francis. The only other North American stations for the Bog Adder's Mouth are at Ketchikan, Alaska, and in two counties in the State of Minnesota.—A. E. ALLIN.

THE SMELT IN UPPER ST. LAWRENCE WATERS.—In the spring of 1939, smelt, *Osmerus mordax* (Mitchill), appeared below the dam of the Gananoque River. On May 4 several were caught in the raceway of the hydro plant, the first specimens to be reported from the upper St. Lawrence river. This raceway is about 100 feet in length, 15 feet wide and two to three feet in depth, blasted through sandstone and quite a fast current. The water flows constantly as the electric plant supplies part of the current used in the town of Gananoque. Such conditions,—fast water, constant flow and rocky or gravelly bottom,—are ideal for the spawning of the smelt.—G. C. TONER.

EUROPEAN CORMORANTS NESTING IN NOVA SCOTIA.—For more than 15 years a colony of Double-crested Cormorants (*Phalacrocorax auritus auritus*) has been nesting on a high gypsum cliff about 10 miles north of Antigonish, Nova Scotia. On June 8, 1937, I first visited the colony and estimated that there were nearly 300 pairs nesting, young birds being present in most of the nests. One hundred young were banded at that time. No other species of cormorant was found in the colony in 1937.

My second visit to the colony was on May 30, 1939, when I was surprised to find that about one-fifth to one-fourth of the adult birds present were European Cormorants (*Phalacrocorax carbo carbo*). A total of 212 occupied nests of both species was counted, all but two still containing eggs, but it was not possible to determine the number of nests of each of the two Cormorants. Three or four adult European Cormorants were observed to be wearing bands. According to the records of the Biological Survey, Washington, D.C., the only European Cormorants that have been banded in North America are those which Dr. Harrison F.

Lewis has banded during the past few years at Lake Island, Wapitagan, and St. Mary Islands, all in Saguenay County, on the north shore of the Gulf of St. Lawrence, Quebec. Consequently the banded birds represent an interesting recovery record, and indicate that the European Cormorants must have come to the Antigonish colony from the north shore of the Gulf of St. Lawrence rather than from the closer colonies reported on the Magdalen Islands or islands off Cape Breton Island.

It is believed that the European Cormorants first invaded the Antigonish colony during the summer of 1938, because Mr. Hoyes Lloyd, National Parks Bureau, Ottawa, has received from correspondants two picture post cards of this colony taken in 1938 that clearly show the two species of Cormorants to be present.—HAROLD S. PETERS, *U.S. Biological Survey, Charleston, S.C.*

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## REVIEWS

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THE RECENT MAMMALS OF IDAHO.—By William B. Davis. *Contribution from The Museum of Vertebrate Zoology, University of California, Berkeley. The Caxton Printers, Ltd., Caldwell, Idaho. April 5, 1939. Cloth, 6" x 9", pp. 400, frontispiece, relief map of Idaho, figs. 33. \$5.00.*

This volume gives the only complete account of the mammals of Idaho and in the opinion of the reviewer is the most complete account that has ever been published on the mammals of any one of the United States. The 141 kinds of mammals recognized as occurring in the State are fully treated, the generally accepted scientific name being given, with citation of the original description, type locality, synonyms, and the common or vernacular name which seemed best applicable. The ecology of each species and the most important records of each subspecies are given, and the characters of the orders, families and of many of the genera are given in section headings, making the book a comprehensive treatise of the mammals of the State. It is not a picture book, but the descriptions are adequate for determining specimens and the accounts of life history are well selected, making the book valuable to naturalists, teachers of biology, game officials, agricultural officials, sportsmen, and all people who are interested in Western mammals. 22 distribution maps are given where needed to show distribution of species and races and 16 artificial keys assist in determination of species and subspecies. The Caxton Printers are to be congratulated in getting out a good specimen of the printing art, on good paper with clear type, with only one error noted by an old proofreader<sup>1</sup>.

Idaho is a large State of 88,888 square miles, extending from the Canadian border nearly 500 miles to the southward, and 312 miles from east to west, the northern tip of the pan-handle reaching southeastern British Columbia, while the States of Montana and Wyoming border on the east, Utah and Nevada on the South, and Oregon and Washington on the west. Zoögeographically, the faunas and floras of the North Pacific Coast, the Rocky Mountains, and the Great Basin meet in the State and help to make a composite fauna and flora. The altitude varies from 710 feet on the Snake River at Lewiston, to 12,655 feet at the top of Mt. Borah in the Pahsimeroi Mountains, and temperatures range from 110° F. in the shade to -45° F. Dr. C. Hart Merriam (1891) considered the Life Zones of south-central Idaho as ranging from Upper Sonoran to Arctic-Alpine, but Dr. Davis in the present volume prefers to assign the fauna to three, or possibly five, "biotic areas," considered as faunal-floral units within which exist at the present an assemblage of animals and plants which has become recognizable from assemblages in adjoining areas. He states that 56 kinds of mammals appeared to be limited in their distribution by climatic factors, largely temperature, while the remaining 70 kinds may be assigned to areas which are not determined by temperature alone, but by the interaction of climatic, geographic, edaphic and biotic factors, each of which, alone, may affect each of the kinds of mammals differently.

The areas recognized are (1) Northern Rocky Mountain Biotic Area, (2) Central Rocky Mountain Area, and (3) the Northern Great Basin Biotic Area. Two other areas which are less well defined in Idaho, may be recognized as (4) Co-

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1. Subheading on p. 305, line 9, should read "Genus Clethrionomys Tilesius" not "Tsilseus."

lumbian Plateau Biotic Area, and (5) the Payette Biotic Area. Within these areas certain definite habitats or associations are mentioned: (1) Marsh Association, (2) Meadow Association, (3) Prairie Association, (4) Chaparral Association, (5) Deciduous Woodland Association, (5) Coniferous Association types, and (6) Rock Association.

The "Northern Rocky Mountain Biotic Area" is of the greatest interest to Canadian naturalists, comprising as it does, "the northern portion of the state, is a southward extension of a more extensive area occupying the greater part of southeastern British Columbia, northwestern Montana and portions of northeastern Washington. Its southern limits in Idaho appear to be in the vicinity of the Salmon River where it transects the state into northern and southern parts." Mammalogists who are familiar with the distribution of mammals in southern British Columbia will be interested in studying the distribution maps carefully, and will find that some mammals which are essentially northern, as the mountain woodchuck (*Marmota monax petrensis*), Kootenay red-backed mouse (*Clethrionomys gapperi saturatus*), Rocky Mountain phenacomys (*Phenacomys intermedius*), Kootenay jumping mouse (*Zapus princeps kootenayensis*), are found in northern Idaho, while others which are more common farther south, as the Rocky Mountain meadow mouse (*Microtus pennsylvanicus modestus*), Coeur d'Alene pocket gopher (*Thomomys talpoides saturatus*), and Rufous-tailed Chipmunk (*Eutamias ruficaudus simulans*), penetrate a short distance into British Columbia. It may be noted here that the pocket gophers of the Prairie Provinces (*Thomomys talpoides*), the ranges of which do not touch the ranges of the British Columbia pocket gophers of the *Thomomys fuscus* group, and which have heretofore been treated as distinct species, are now shown to intergrade to the southward and should now all be considered as subspecies of the widely-ranging species *Thomomys talpoides*. It is also interesting to note, although not mentioned in the volume under review, that the Montana hoary marmot (*Marmota caligata nivalis*) is now known to range from north-central Idaho northeastward into extreme southwestern Alberta, and the pale yellow-bellied woodchuck (*Marmota flaviventris avara*) ranges from southwestern Idaho northwestward into the southern part of Columbia and Okanagan valleys in southern British Columbia.

The exceedingly diverse physiographic features

of Idaho, and abrupt boundaries of different areas, combined with great extremes of temperature and humidity, have made distributional problems very complex. The author states that the mammalian fauna is not static, but changing. "It consists of elements which have moved in recently, or are now moving in, plus a core that has been present in the area since the Pleistocene, or earlier. Certain kinds appear to have moved in from the south, others from the north, and still others from the east; the east-west course of the Snake River has influenced greatly the present distribution of recent immigrants."

The author has discussed the geological situation briefly and the climate more exhaustively, and brings up many ideas which will be of interest to all students of the problems of animal distribution. He shows that while the occurrence of any species depends primarily on the availability of suitable food, the presence of safe breeding places and of cover or places of temporary refuge are almost equally important. Discussing the influence of large rivers as barriers to spread of species, the author concludes that hibernating, land-dwelling mammals which are closely restricted to a definite home territory and do not ordinarily swim are different on the two sides of a river; also that burrowing kinds are usually different on the two sides. On the other hand, he states that in every instance of which he is aware, nonburrowing and nonhibernating forms are the same on the two sides. He also suggests that certain nonhibernating animals, as pocket gophers, which are unable to travel over dry rocky areas in summer, may be able to pass over safely by burrowing under the snow in winter. It may be mentioned that while the book has many very useful maps, showing sectional profiles of Idaho, distribution of coniferous forests, biotic areas, and a map showing the type localities of the 43 specific and subspecific names which are based on Idaho-taken mammals, as well as an extremely useful gazetteer of localities mentioned, there is no map showing the location and names of the counties of Idaho, and it is frequently difficult to locate records of specimens if a large atlas is not available.

Various other problems of animal and plant distribution are discussed at greater or less length, and give food for thought. Altogether the book is one of the most valuable and stimulating books on North America mammals which have appeared for a long time, and may well be a model for other States and Provinces.—R. M. A.

CANADIAN NATURE.—*Bi-monthly, published by Whittemore Publishing Company, Limited; edited by A. R. Whittemore, W. G. Clements and Wm. C. Mansell; editorial offices, 177 Jarvis Street, Toronto; subscriptions \$2.00 a year in Canada and the United States, \$2.50 foreign.*

So far as is known the publication of *Canadian Nature* marks the first attempt to provide an illustrated natural history magazine devoted entirely to the publication of popular articles for Canadian readers. Volume 1, number 1, was issued for September-October, 1939, beautifully printed on heavily-sized stock, and number 2 for November-December followed in due course. The layout is excellent, illustrations are well-chosen, even though some were already familiar, and the subject matter is particularly adapted for use in schools. In neither of the two issues is there any intrusion into the field occupied by *The Canadian Field-Naturalist* and its predecessors for more than sixty years, namely that of publishing the results of original observations and investigations in Canadian natural history. The publisher and editors are to be congratulated on their good work, which will surely bear much fruit.

Although *Canadian Nature* is not sponsored by any organization its efforts are being directed towards the support of nature clubs.

The magazine is dedicated by Mr. Whittemore to the memory of his wife who was devoted to the furtherance of nature study. Mindful of the loss commemorated in this dedication we are further saddened to note among the first contributors Thornton Mustard, late principal of Toronto Normal School, a victim of the Athenia atrocity, and Fred Barratt, an artist of unusual promise whose career was closed by death when his talents were just beginning to be recognized.—C.H.D.C.

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CANADIAN LAND BIRDS.—*A Pocket Field Guide, by P. A. Taverner, illustrated by Allan Brooks, F. C. Hennessey and P. A. Taverner, Toronto, 1939, The Musson Book Company Limited; pp. 279, 113 coloured plates and many drawings in black and white; small 8 vo. \$2.50.*

CANADIAN WATER BIRDS.—*Game Birds: Birds of Prey. A Pocket Field Guide, by P. A. Taverner; illustrated by Allan Brooks, F. C. Hennessey and P. A. Taverner. Toronto, 1939.*

*The Musson Book Company Limited; pp. 293, nearly 100 plates in four colours, and many drawings in black and white; small 8 vo. \$2.50.*

When the reviewer was just beginning to take a keen interest in birds he came into possession of a copy of Taverner's *Birds of Eastern Canada*, then just issued. Here at last was the book he had wanted, a Canadian bird book. Since then it has been replaced by *Birds of Canada*; now the answer to the question of what book to place in the hands of Canadians beginning to take an interest in birds will be found in the two compact little volumes described above. The joy that was produced by *Birds of Eastern Canada* will find a much louder echo now, because in *Canadian Land Birds* and *Canadian Water Birds* the needs of the amateur are given first consideration.

While these books are primarily field guides the author has managed to include a great store of general information. There is, in *Canadian Land Birds*, a general chapter on methods of bird study, one on birds and the garden, and a colour key designed for field use. It is noted that the author has a good word to say in the same volume for egg collecting; the caution might well have been added that under the Migratory Bird Treaty and the Regulations enforcing its provisions a scientific collector's permit is needed for such operations.

*Canadian Water Birds* is dedicated primarily to sportsmen, who, taken by and large, are often quite ignorant of the specific identity of the birds that they shoot. The key in the front of this volume will be most useful to those who have their bird in the hand rather than on the water several hundred yards away. The introduction contains a common sense discussion on conservation that will be appreciated by sportsmen. It also describes bird-photography and bird-banding, two hobbies whereby the amateur can enjoy birds profitably without killing them.

Merely to know birds and be able to identify them is a source of keen pleasure to hundreds, whose ranks should now grow constantly. With these two books and a good pair of binoculars anyone can learn to identify most of our Canadian birds in the field. Fond parents and other patrons of aspiring bird lovers are warned against giving one volume without at least making arrangements to follow up with the other.—C.H.D.C.

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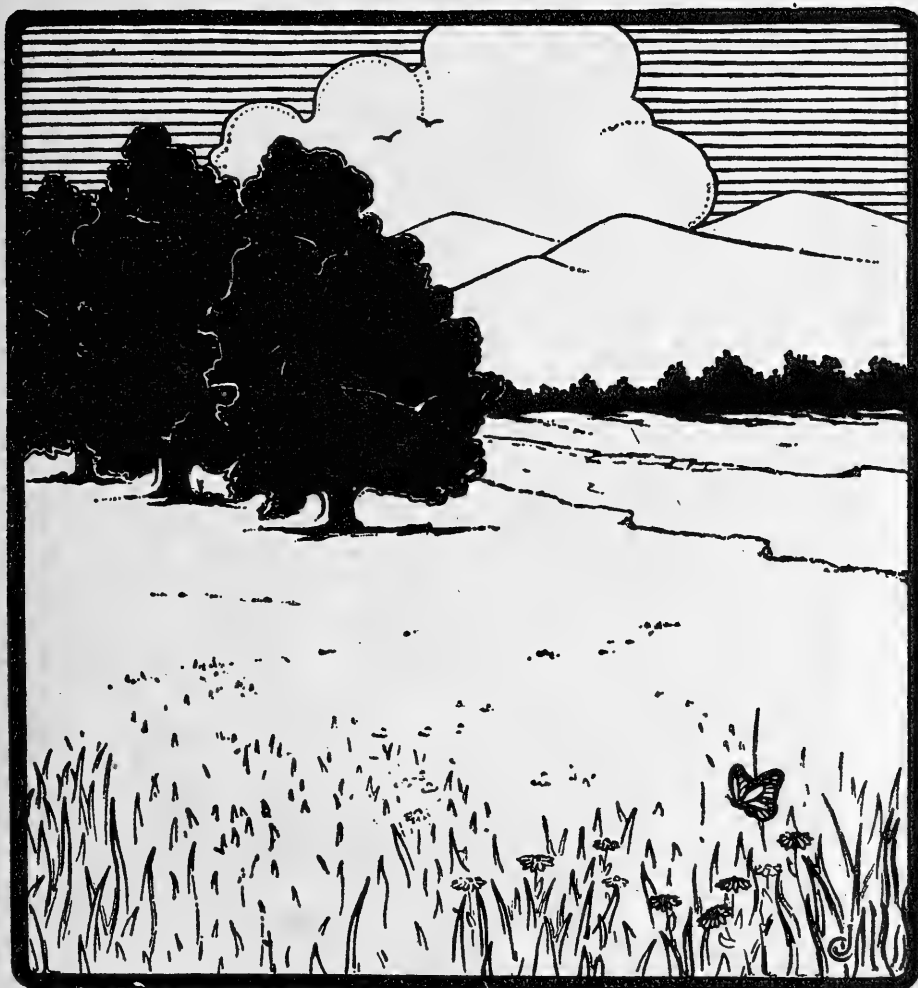
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# The Canadian Field-Naturalist

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OTTAWA, CANADA, MAY, 1940

No. 5

## CHIEF FACTOR JAMES ANDERSON'S BACK RIVER JOURNAL OF 1855

### INTRODUCTION

**T**HE CANADIAN FIELD-NATURALIST has always been alive to the value of even the most general observations relating to the more remote and poorly-known parts of Canada, and on several occasions has assisted in making such observations available by publishing them. In this issue, by the permission of the Director, Lands, Parks and Forests Branch, Department of Mines and Resources, and with the approval of the Hudson's Bay Company, we are able to begin the publication of Chief Factor James Anderson's Journal of his expedition in search of traces of Sir John Franklin in 1855.

The Journal is taken from a bound volume of typewritten sheets in the library of the Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa. It contains the Journal, several other letters and reports of Chief Factor Anderson, and a copy of Robert Campbell's diary of his exploration of the Pelly River as printed by the *Manitoba Free Press* in 1885. The volume was formerly in the library of the Commission of Conservation, and originally came from the library of the Chief Geographer, Mr. James White, who afterwards served as secretary of the Commission.

Though the circumstances surrounding the transcription of the Journal are not known, its origin is easy to determine. On Friday, April 6, 1888, Mr. James Anderson, son of Chief Factor James Anderson, appeared before the Select Committee of the Senate of Canada, appointed to enquire into the resources of the Great Mackenzie Basin. He exhibited to the Committee a diary of his father's, which included his personal journal of a trip in search of Sir John Franklin. Notes from the journal included in the Committee's report agree with the MS, and it is likely also that other papers in the MS volume were with the documents exhibited to the Senate Committee.

In the Archives of the Hudson's Bay Company there is a diary forwarded by Chief Factor

Anderson to his superior officers, and in the Journal of the Royal Geographical Society for 1857, Vol. 27, pp. 321-328, Sir John Richardson published a series of extracts from it, covering the days from July 30 to August 22. For the days in this period the diary from July 30 to August 13 seems to be published in full, as does also that for August 20. Comparison of the entries with those to be published here show that while the facts tally, the two documents are quite different in text. The Hudson's Bay Company Archives diary is a much more polished document, which tends to omit details of the daily routine and to enlarge on subjects that Anderson knew were of particular interest to those who would be reading it. By letter of May 12, 1938, the Hudson's Bay Company communicated to Mr. M. G. Cameron, of the Air Surveys Section, Bureau of Geology and Topography, Department of Mines and Resources, extracts from the diary in their possession for use in mapping the route traversed by Anderson. The style is similar to those published by Richardson, and in fact the letter states that Richardson's text is that of the diary in their Archives.

The Journal we are publishing must be, then, Anderson's field note-book, and it should not detract from the value, for future publication, at least in sufficient detail for comparison, of the diary in the Hudson's Bay Company's Archives. Nothing is known of the fate of the diary exhibited to the Senate Committee of 1888. It is evident that there were other Journals, some earlier and some later than the Back River Journal. Apparently only documents of geographical interest were copied, and all the Journals, which dealt in the main with James Anderson's private affairs, were returned to his son when the copying was done. If any papers or records were deposited with the records of the Senate they would have been destroyed at the time of the fire in 1916. During the sittings in 1888 two great Canadian scientists, Dr. George M. Dawson and

Professor John Macoun, examined the Journals, and it is likely that one or both of these men, most probably Dawson, had the Back River diary and other papers copied, and that the type-written sheets were bound later with other geographical papers at the instance of Mr. James White.

The Back River Journal is here printed *verbatim* from the MS. copy. The otherwise inexplicable use of double page numbers and different lengths of pages suggest that the original paging was followed in the copy, so that page numbers, dates and titles are inserted here in their proper places. Many mistakes in spelling are found; in many cases they are obviously the fault of the person who typed the copy, but this can never be stated with certainty.

For a history of the organization of the expedition the Parliamentary Arctic Expedition Papers should be consulted.<sup>1</sup> When Dr. Rae's report of his discovery of the fate of Sir John Franklin's expedition was transmitted to the Lords Commissioners of the Admiralty by the Hudson's Bay Company, the Admiralty expressed their "earnest anxiety" that an expedition (one of two proposed by them) should proceed to the mouth of the Back River (Great Fish River) where Eskimo reports indicated that the men of the *Erebus* and *Terror* had perished. The command of this expedition was given to "Mr. C. J. James Anderson" with James Green Stewart as second-in-command. Anderson was at that time in charge of "McKenzie's River" District of the Hudson's Bay Company, with headquarters at Fort Simpson. He was given a hand-picked crew, including three Iroquois voyageurs sent all the way from Montreal by way of Chicago.

Further information on the expedition is to be found in the next of the Parliamentary Arctic Papers.<sup>2</sup> On September 15, 1855, Anderson wrote to Sir George Simpson, giving a summary of the expedition (Further Papers, 1856, pp. 25-29). In addition to the correspondence published in the Parliamentary Papers, Anderson's letter was published in the Journal of The Royal Geographical Society, Vol. 26, pp. 18-25, and some extracts from his Journal, already referred to, were published

by Richardson. In Preble's compilation<sup>3</sup> of faunal records for the Canadian Northwest the only references to the Anderson-Stewart expedition were from the two latter publications, lack of reference to the wealth of material in the Parliamentary Arctic Papers being a conspicuous omission in Preble's work.

The expedition was so little known that when one of the Back River Eskimos told Hanbury<sup>4</sup> in 1902 that two canoes full of white men had gone down the river when he was a boy, Hanbury put him down as a liar. The fact that the Anderson Journal was never published has kept him and the Hudson's Bay Company from the credit that is their due for this expedition, an injustice that will now be righted.

The expedition was a worthy accomplishment even for the hardy men who participated in it. As was the case in Back's return trip<sup>5</sup> when the river was first explored, the weather was very bad, but the men did their work cheerfully. Anderson's letter (Further Papers, 1856, p. 26) describes the crossing of the Mountain Portage, one of the most difficult in Canada: "Immediately after breakfast the portage was begun, and . . . at 10½ p.m., our fine fellows were descending a steep mountain with the canoes, singing "La Violette." Anderson himself was an unusually keen observer as his Journal shows. He did not discover as much about the Franklin expedition as had been hoped, but he covered the ground assigned to him thoroughly. The history of the Franklin expedition is so well known now that the pieces have been put together with only a few missing.<sup>6</sup> Today we are more interested in the general observation as they were written down day by day in a country not much visited by white men even at the present time.

In annotating the Back River Journal the editor has had the assistance of Messrs. M. G. Cameron, J. R. Dymond, A. E. Porsild, P. A. Taverner, and Drs. R. M. Anderson and Dymond Jenness, to all of whom he wishes to express his thanks.—Editor.

3. Preble, E. A.—A Biological Investigation of the Athabaska-Mackenzie Region. U.S. Dept. Agr., Bureau of Biol. Survey, N.A. Fauna No. 27, 1908.

4. Hanbury, D. T.—Sport and Travel in the Northland of Canada. London, 1904.

5. Back, G.—Narrative of the Arctic Land Expedition to the mouth of the Great Fish River. London, 1836.

6. Gibson, William, Sir John Franklin's Last Voyage. The Beaver, Outfit 268, No. 1, pp. 44-75.

1. Report from the Select Committee on Arctic Expedition, together with the proceedings of the Committee, Minutes of Evidence, and Appendix, House of Commons, London; 1855, p.p. 846-858.

2. Further Papers relative to the Recent Arctic Expeditions in search of Sir John Franklin and the crews of Her Majesty's Ships "Erebus" and "Terror." House of Commons, London; 1856, pp. 19-29.

JOURNAL OF CHIEF FACTOR ANDERSON OF THE H. B. Co., OF A JOURNEY FROM FORT SIMPSON, MCKENZIE RIVER,<sup>7</sup> TO THE MOUTH OF THE GREAT FISH RIVER,<sup>8</sup> VIA GREAT SLAVE LAKE ETC., 1855.

*Simpson* Monday, 28th May. I took my departure with 2 canoes and 10 men laden *Big Island* with supplies for the Exped'n at a *1855* little after midday. Ice still drifting in the Upper McKenzie. We broke one of the canoes. Near Green Island<sup>9</sup> it drifted so thickly that we were compelled to encamp at 7½ h. p.m. at the head of the Islands. The water appears to have risen very high in the River, appearance of several Dykes<sup>10</sup>.

Tuesday 29. Detained by ice till 8½ a.m. when we left and reached the point below Rabbit Skin River,<sup>11</sup> where we were compelled to encamp, the ice drifting very thickly; in the midst of this B. Le Noir came drifting in a small canoe; he says the river is free as far as Contauz Jaunes Rr.<sup>12</sup> but impracticable for even a boat to ascend. The people shot a few ducks and rabbits.<sup>13</sup> A few drops of rain fell and the sky was overcast all day. Got 9 French stock duck's eggs.<sup>14</sup>

(*Simpson to Big Island, 1855.—2—*)

May Wed. 30th. The ice detained us till 10½ a.m. We got many knocks and rubs, but reached Spence's Rr.<sup>15</sup> at 8½ h.p.m. Saw Babilland<sup>16</sup> &c and old Le Noir and son; got a few fish, 2 geese,<sup>17</sup> a beaver<sup>18</sup> and a piece of bear<sup>19</sup> from them; they had hunts varying from 40 to upwards

7. Now officially given as "Mackenzie."

8. From the Indian name, Thlew-y-cho; now called after Sir George Back, who was the first to descend it.

9. 13 miles from Simpson; shown on four mile Map Sheet No. 12, Mackenzie River Series, Department of Interior, 1923, (M.G.C.).

10. The meaning of dykes is obscure—possibly stones and earth pushed up the bank by ice, which would indicate the height attained by the river.

11. 22 miles from Simpson; shown on four mile Map Sheet No. 12, Mackenzie River Series, Department of Interior, 1923. (M.G.C.).

12. Couteaux Jaunes R.—Undoubtedly shown as Redknife river on the four mile Map Sheet No. 12, Mackenzie River Series, Department of Interior, 1923; 93 miles from Simpson. (M.G.C.).

13. Varying Hare, *Lepus americanus* (R.M.A.).

14. Mallard, *Anas platyrhynchos*. (P.A.T.).

15. 37 miles from Simpson; shown on four mile Map Sheet No. 12; Mackenzie River Series, Department of Interior, 1923. (M.G.C.).

16. Possibly incorrectly copied from "Robillard," or "Babillard."

17. Probably Canada Goose, *Branta canadensis*. (P.A.T.).

18. *Castor canadensis* (R.M.A.).

19. Black Bear, *Ursus americanus*. (R.M.A.).

of 100 MBr.<sup>20</sup> The birches<sup>21</sup> and poplars<sup>22</sup> begin to put out their leaves. The weather was warm today—previous to leaving Fort Simpson the highest the Therm. reached this spring was—62.<sup>23</sup>

Thur. 31st. After gumming the canoes embarked at 4½ a.m. Obligated to take to the paddle owing to the quantities of ice on Beach. Experienced some heavy showers, accompanied by thunder. We had too much trouble with drift ice, but managed to reach a little above the stream when we saw the ice coming down full channel, evidently from the little

*Simpson* Lake. By using our best exertions *to* we managed to get our canoes out *Resolution* of the water (5 p.m.) just as the ice came down with tremendous force, sending huge boulders up the Bank like Skittle Balls. The canoes suffered much today; on one occasion a mass of ice tumbled from off the Bank, seant<sup>24</sup> a wave into the canoe and *broke the paddle of one of the men*; a few inches more and we should have been all smashed into a thousand pieces; as it was we escaped, except (*Simpson to Big Island—3—*) an Indian who was hurt by the handle of the broken paddle being driven into his side.

June—Friday—1. Detained all day by ice; immense quantities have passed. About 3 a.m. this water rose with a sudden rush, bringing down immense fields, portions of which were shoved with tremendous force up the bank. Fortunately

I caused the baggage and canoes to *Simpson* be carried high up before the men *to* went to sleep—still one of our canoes *Big Island* had a narrow escape. The ice tho' still (8½ p.m.) drifting thickly is getting a little clearer. This is a bad place for hunting; nothing has been killed today by the hunters. Weather warm.

Sat. 2nd. Still detained by ice. Cloudy with some slight showers. The Big Island boat arrived at 11 a.m. took out its crew and sent the Simpson

20. "Made Beaver" or "skin," a unit of exchange, formerly based on the value of one beaver skin, but gradually divorced from this connection. The wooden tokens used in trading this day are referred to as "skins," and the value of a skin is now taken to be about fifty cents. Anderson did not mean that the men had killed 40 to 100 beaver each, but rather that each had taken 40 to 100 skins worth of fur, at the current rate for the Fort Simpson District. In another part of the MS volume Anderson gives the average value of 1 M Br. in furs (1850-53) as 14s 11d and the average cost of 1 M Br. in goods for the same period as 8s 5d.

21. *Betula papyrifera* is the common tree-like birch of the region. (A.E.P.).

22. *Populus tacamahacca* (A.E.P.).

23. Undoubtedly 62 F, not -62 F.

24. Sent.

people, except two Indians, back in it; Mr. Clarke was a passenger.

The ice is drifting thinly this evening and I am in hopes that we shall be able to leave in the morning.

Sun. 3rd. Cloudy all day. Just as we were preparing to leave this, a canoe arrived from Simpson, which Mr. Milles was kind enough to send with some provisions upon learning the state of the ice from the Indians; of them (*June, 1855, Simpson to Big Island—4—*) I took a bag of Pem'n<sup>25</sup> and sent back the remainder. We left rather too soon as we broke both canoes with ice and were compelled to put on shore to repair them; it was tough work getting up to the head of our line;<sup>26</sup> the water is high which precludes tracking and the current very strong. Both canoes were nearly upset in rounding fallen trees, and the old canoes had a most narrow escape of being crushed by a flow of ice. Saw 5 Indians with excellent hunts and a boy of 12 years old who had killed 70 M Br in Martens—the lowest the men had was 80, the others 100 and upwards. Encamped late in the little Lake opposite Point au Foin;<sup>27</sup> men much fatigued after this hard day's work—it was one continual stretch.

Mon. 4th. A Beautiful calm warm day. Vegetation has made considerable advances during the last 2 or 3 days. We left the encampment at 4 a.m. and encamped at 7½ p.m. the canoes requiring considerable repairs—at a pipe<sup>28</sup> from the small lake close to the "Ecaurs,"<sup>29</sup> saw only a few pieces of ice, until we encamped when we saw a considerable quantity, I suppose from the small lake. Saw old Bedean<sup>30</sup> and the Grand Noir. The men who are unaccustomed to the paddle (*June, 1855, Simpson to Big Island—5—*) complain of sore arms and breasts.

25. Pemmican, pounded dry (buffalo) meat and fat mixed together.

26. 67 miles from Simpson. The river from here to Simpson is narrow and swift, and it is necessary to track canoes coming up, hence it is known as Head of Line. (M.G.C.).

27. Hay was cut at a place about four miles above the mouth of Trout river, 78 miles from Simpson, as shown on four mile Map Sheet No. 12, Mackenzie River Series, Dept. of Interior, 1923. Point aux Foins shown opposite this place on the north side by E. Petitot on his map of the Mackenzie Basin, 1875. (M.G.C.).

28. As a unit of time and distance a pipe might mean the time taken to smoke a pipe and the distance that could be travelled in such a time, or it might mean the time (and distance) between pauses for the purpose of smoking or "lighting up."

29. Probably meant to be "Pointe des Petites Ecores," as shown on E. Petitot's map of the Mackenzie Basin, Geog. Soc. of Paris, Vol. 10, 1875, on north side of river, about 120 miles from Simpson. (M.G.C.).

30. Possibly Bedeau.

Tuesd. 5th. Left early, but were stopped by a large body of ice (or rather a stream of drift ice apparently much broken) supposed to have come from the Channels about Big Island. Did not unload till sunset, in hopes of a passage clearing. In the evening a heavy gale arose. We are encamped in the little Lake opposite Lap Stick Point,<sup>31</sup> the weather warm. I need not say the pain and vexation I feel at these repeated detentions; however, I could do nothing were I further advanced. Slave Lake is still firm, but the appearance even of advancing is consolatory.

Wed. 6th. Left at 7 a.m. Stopped by ice at the Islands<sup>32</sup> at 7½ a.m. until 5 p.m.; we then manage to cross among the drift ice and reached Charleson's Fishery<sup>33</sup> where we were again compelled to encamp by our enemy at 8 p.m. Stopped at an Island where we saw many of the small forked tail black-headed Tern;<sup>34</sup> they had just begun to make their nests but had laid no eggs; saw one of these birds drive off a crow.<sup>35</sup> Goose berries<sup>36</sup> in flower. Very warm and clear (*Simpson to Big Island—6—*) till the evening when it was overcast. Mosquitoes troublesome.

Thurs. 7. Detained here the entire day by ice drifting so thick that we can't see water; it is all smashed into separate candles. Very sultry; thunder at some distance; a few drops of rain fell here, but heavy showers falling to the Nd. Saw a grasshopper. Strawberries<sup>37</sup> in flower.

Frid. 8th. Another warm day; thunder at intervals and a shower in the evening. Mosquitoes rather troublesome. Still detained by ice which is drifting full channel.

Sat. 9th. Another warm day. Cloudy at intervals with a few drops of rain. Still detained by ice running full channel. Saw a dragon fly and some yellow butterflies.

31. Lop-stick Point—This must have been a point on Mills lake, shown on Sheet No. 12 of the Mackenzie River Series. The exact location of the point is not known. (M.G.C.).

32. In all probability those islands at the east end of Mills lake, 140 miles from Simpson, shown on Sheet No. 12 of Mackenzie River Series. (M.G.C.).

33. Possibly near the mouth of Horn river where the present Indian village is marked on Sheet No. 12 of the Mackenzie River Series. (M.G.C.).

34. Probably Arctic Tern, *Sterna paradisaea* (c.f. Preble, foot-note No. 3) (P.A.T.).

35. Since some of the "crows" seen by Anderson were certainly ravens it is impossible to say which species is meant here. (P.A.T.).

36. *Ribes oxycanthoides* (A.E.P.).

37. The strawberry common on Great Slave Lake and the Upper Mackenzie is *Fragaria glauca* (A.E.P.).

Sunday. 10th. At 3 p.m. we managed to cross the river amongst the drift ice and put ashore to supper at 9 p.m.; after which we continued our route. Very warm, sultry; about 6½ p.m. the sky to the N. Wt. became of an inky color with long streamers like waving hair hanging like a fringe; the sun shone through this as if a halo had been cut (*June, 1855, Simpson to Big Island*—7—) in the cloud; this shifted gradually round the compass, Ey.,<sup>38</sup> accompanied by violent squalls and heavy showers of hail and rain. We had some narrow shaves in the ice and the tracking at the Rapid was execrable.

Mond. 11th. We marched<sup>39</sup> all last night—got up the Batteau Rapid<sup>40</sup> about daybreak; when we were within sight of Isle aux Bruleaux<sup>41</sup> we were again stopped by drift ice, but managed to get on by dint of wading and hauling the canoes through the small channels and afterwards by keeping along shore—which was shoal and full of stones—we reached the point before reaching the Big Island Fort<sup>42</sup> at 5 P.M.; then we were obliged to unload as the channel is choked by ice. Sent all hands to the Fort excepting my servant. Saw some Big Island Indians and one belonging to Resolution, who is waiting for the disruption of the ice to go there. The men marched 26 hours, except during (*June, 1855, Simpson to Big Island*—8—) the time they put on shore to sup and breakfast.

Tuesday 12th. The ice cleared sufficiently about mid-day to cross over to the Island along which we found a channel, and reached a point on it about 15 miles from B.I. at 6 p.m. Here we found our road barred by ice and encamped on a nasty swampy point. Set a short net which yielded by

sunset 3 fine trout, 8 W. fish and 13 Red Carp<sup>43</sup>.

Wed. 13th. Detained all day by ice.

*Big Island* The water rose and drove us to another encampment; obliged to take

*Resolution* up the net as the ice was covering it—it yielded 32 fish, chiefly white fish.

Some marsh flowers are in bloom, such as the large buttercup<sup>44</sup>. It is blowing fresh from the N.E. The land here is evidently encroaching on the Lake; the process is first driftwood, then a sediment of mud; moss then springs up and grass and marsh plants, willows take root and, when the ground is a little raised, birch—beyond that (*June, 1855, Big Island to Resolution*—9—) spruce; the leaves of the Birch here are just appearing and the grass is 18 inches high, though the ground is frozen six inches from the surface.

Thurs. 14th. Heavy rain with wind all night. The ice is packed against the beach so that we cannot even set a net.

Friday 16th. Calm and cloudy—a most gloomy day; ice as yesterday. This perpetual detention is most disressing, but it is useless repining.

Sat. 16th. Very warm with a slight shower, foggy, Mosquitoes dreadfully thick. About 5 p.m. we managed to set off from our beastly, swampy encampment. We found some lanes of water and bored through much drift ice till we reached near the De Marais Islands,<sup>45</sup> where we could get no further, the ice being hard and in close pack. At the same time the fog was impenetrable. It was an awkward situation. We bored away into the bay and suddenly came on one of the Islands and afterwards (*June, 1855, Big Island to Resolution*—10—) managed to reach the last one by sunset. Canoes rather damaged. Saw several fields of ice still white and hard; very cold in the evenings. Set the net.

(To be continued)

38. Easterly; cf. also Ny, Sy, and Wy.

39. A voyageur expression adopted into the English of the north; in the case of the well-known command to dogs it has degenerated into "mush."

40. Just above Providence is a strong current due to the narrow contracted channel which is called "The Rapid," although there is plenty of water; Sir Alexander Mackenzie is reported to have sounded and got 21 feet here. No mention is made of Providence which it is reported by Preble, was not established until 1868. On the south side of Meridian Island opposite Providence, there are numerous rapids, making the south channel impassable to big boats. 156 miles from Simpson. (M.G.C.).

41. Undoubtedly "Isle aux Bouleaux," shown on E. Petitot's map, about 2½ miles below Big Island. 182 miles from Simpson. (M.G.C.).

42. This is shown on E. Petitot's map, 1875, to have been on the north shore of Great Slave lake, opposite the eastern end of Big Island, established 1847, abandoned 1868, according to Preble. Approximately 200 miles from Simpson. (M.G.C.).

43. Trout—*Cristivomer namaycush*; white fish, *Coregonus clupeaformis*; Red Carp, *Catostomus catostomus* or *Moxostoma lesueurii*. (J.R.D.).

44. Probably *Caltha palustris*, or marsh marigold. (A.E.P.).

45. Iles des Marais, along the south shore of Great Slave lake opposite the east end of Big Island, shown on the map of Great Slave lake, Western Sheet, Department of Interior, 1928. 27 miles west of Hay River post. (M.G.C.).

## MISCELLANEOUS CONTRIBUTIONS FROM THE NATIONAL HERBARIUM OF CANADA II.

By A. E. PORSILD.

*Cassiope lycopodioides* (Pall.) Don.—White Pass, Northern British Columbia: rocky slopes and crevices, 2000-3000 ft. elevation, June 25, 1936, E & G. Lohbrunner, No. 25 (CAN & V)<sup>1</sup>

Outside of northeastern Asia this species was previously known from the Aleutian Islands and from the south and southeast coast of Alaska but apparently it has not previously been recorded from Canada.

*Cassiope tetragona* (L.) Don. ssp. *saximontana* (Small) n. comb. *C. saximontana* Small, N. Am. Flora, 29:59 (1914).

The arctic white heather, *Cassiope tetragona* is a circumpolar, arctic or high-arctic species which, outside the arctic regions, is known from a few stations in high mountains of northern Eurasia. In arctic regions of North America, from northern Greenland to northern Alaska, it is perhaps the most ubiquitous of the dwarf shrubs and, because of its omnipresence and because it burns well and produces a hot fire even when moderately wet it is an important fuel for travellers and residents of those regions (Porsild 7). In Greenland it reaches 82° N. lat. but is absent in the southern part. On the North American continent its southern limit is on the west coast of Hudson Bay, near Churchill, Manitoba. A map showing the world distribution of *Cassiope tetragona* is given by Rikli (10).

Small, l.c., segregated from the circumpolar *Cassiope tetragona*, the plant which in the Canadian Rockies had previously passed under that name, but no one appears to have taken up his name, except Kirkwood (5) who under *C. tetragona* mentions *C. saximontana*, saying that "it is said to differ from *C. tetragona* in having more slender branches."

In the Canadian Cordillera *C. tetragona* ssp. *saximontana* apparently takes the place of the species and in high mountains reaches south to the 49th parallel. The writer has seen no typical *C. tetragona* from Alberta or from British Columbia and he suspects that what is treated as such by

Howell (4, in part), Rydberg (11), Henry (3) and Piper & Beattie (6) all belong to the subspecies. In Britton & Brown (2) *C. tetragona* is said to reach Oregon.

*Cassiope tetragona* ssp. *saximontana* has often been confused with *C. Mertensiana* which it resembles superficially but from which it may at once be distinguished by the presence of a groove on the back of the leaf-blade.

Small, l.c., has correctly described his segregate as having more slender branches and by having much shorter pedicels than *C. tetragona*. Also the flowers are somewhat smaller. According to Small the corollas are from 3.5 to 4 mm. long in *C. saximontana* against 5 to 6 mm. in *C. tetragona*. In the key to the genus Small, l.c., erroneously reverses these figures (6-7 mm. against 3-4 mm.). The Rocky Mountain plant, although its distinguishing characters appear to be constant, nevertheless is very close to the species and probably is best treated as a well-defined geographical race of the circumpolar *C. tetragona*.

The writer has seen the following specimens: ALBERTA: Sulphur Mt., Banff, McCalla, No. 2161 (TYPE) (NY); same place, M. A. Barber, No. 104 (G); same place, Sanson (CAN 22, 465\*); Mt. Norquay, 7200 ft. Miss D. Pelluet (CAN 91, 770\*); Moose Mt., Elbow R., 6-7000 ft., Wm. Spreadborough (CAN 23,256); Kicking Horse Pass, Macoun (CAN 15,583\*); Mountain Park, near Rocky Pass, J. D. Soper (CAN 106,262); Maligne Lake, Stewardson-Brown, No. 1261\* (CAN; G); North Fork of the Saskatchewan River, *idem* No. 1015 (G); Mountain at Pipestone Creek, 7000 ft. Macoun (CAN 66,457\*); Rocky Mts., Burke (G); Rocky Mts., Bourgeau (G).

BRITISH COLUMBIA: Summit of Cascades, 49° Lat. Dr. Lyall, 1860 (G); Peace River district, Mt. Selwyn, 5000 ft. Raup & Abbe, Nos. 3778 & 4119 (CAN & G).

NORTHWEST TERRITORIES: Liard River, between Nahanni Butte and Simpson, C. H. Crickmay, No. 86 (CAN).

In the above list the specimens marked with an asterisk were named *Cassiope Mertensiana*, the balance, with the exception of the type, were named *C. tetragona*.

1. CAN—National Herbarium of Canada, Ottawa, V—Herbarium of the Provincial Museum of Natural History, Victoria, B.C. NY—Herbarium, New York, Botanical Garden. G—Gray Herbarium, Harvard University, Cambridge, Mass.

✓ *Malaxis paludosa* (L.) Sw.—In a recent number of this journal A. E. Allin (Allin 1) recorded a new station in the Thunder Bay district of northern Ontario, not far from where it was originally collected (Silver Inlet, Port Arthur, Aug. 1909, Henry C. Cowles, CAN).

In the National Herbarium of Canada is another unrecorded station, from British Columbia, Aleza Lake, west of Prince George, June 23, 1930, B. G. Griffith (CAN 122,205). In North America this rare orchid is thus now known from four widely separated stations: Thunder Bay district, Ont.; Otter Tail Co., Minnesota; northern British Columbia and Ketchikan, southeastern Alaska.

✓ *Pedicularis Langsdorffii* Fisch. & Stev.—Jasper Park, Alberta: Pyramid Mt., July 23, 1930 and mountain, 6000 ft. elevation, July 6, 1930, H. M. Laing, Nos. 418 & 417 (CAN). This species, previously known from the Bering Sea region and from central Alaska (Porsild 8) is new to the flora of Canada.

*Downingia laeta* (Greene) Greene, Leaflets, 2:45 (1919); *Bölelia laeta* Greene, Erythea 1:338 (1893). Crane Lake, Sask.: Skull Creek, in brackish marshes, July 3, 1894; same place, in a bog, John Macoun, Nos. 7532 & 7533 (CAN). The above two specimens were kindly named by Dr. Rogers McVaugh, Bur. of Plant Industry, U.S. Department of Agriculture, Washington, D. C.

The genus is new to the flora of Canada.

✓ *Draba lonchocarpa* Rydb. When recently the writer (Porsild 9) published a list of the plants collected in southeastern Alaska by the Mount Logan expedition he hesitated to include this species because of the fragmentary condition of the only specimen available. More ample material has since come to hand which confirms his early determination. The specimens were collected near the head of Chitina River, 61° N. 141° 40' W. on dry slopes at 4000 feet elevation June 26, 1925. H. M. Laing, No. 88.

The species is new to the flora of Alaska.

*Pedicularis ornithoryncha* Benth., in Hook. Fl. Bor.-Am. 2:108 (1838). This rare plant, long known only from the type locality (Mt. Rainier, Wash.) is now also known from Vancouver Island, Elk River, Strathcona Park, J. M. Macoun (CAN 83,199) and on the mainland from Mt. Waddington.

Two new British Columbia stations have recently been added from the Bella Coola region, Rainbow Mts., Mt. Brilliant, 6000 ft. elev. Aug. 24, 1938 and Stuie, Caribou Mts., 6000 ft. and 5700 ft. elev., Aug. 20 and 11, 1938, H. M. Laing, Nos. 653; 655 and 654 (CAN). In addition there is in the National Museum of Canada a specimen from southeastern Alaska, Mt. Head, 56° 5' lat. 131° 9' long., 4200 ft. elev., collected by Otto Klotz, Aug. 6, 1894 (CAN 4196).

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## THE SPREAD OF COTTONTAIL RABBITS IN CANADA

By R. M. ANDERSON



THE EXTENSION of range of at least three kinds of cottontail rabbits has been so rapid within recent years that there is a possibility of overlapping of ranges and confusion of records of "cottontails" and "little brown rabbits in mid-winter."

The Mearns Cottontail, *Sylvilagus floridanus mearnsii* (Allen) was apparently indigenous in extreme southern Ontario, as W. J. Wintemberg has found bones of this species in ancient village sites. E. W. Nelson<sup>1</sup> gives J. H. Fleming as authority for the occurrence of the cottontail in Essex County, Ontario, as early as 1868 or 1870, and they were first noted at Niagara about 1871. The National Museum of Canada has one specimen taken near London, Ontario, in 1883, and four taken in the Toronto region (E. T. Seton collection) from 1885 to 1890. The writer was informed by the late Professor A. B. Klugh that the cottontail had become common in the city of Kingston and abundant in the surrounding country by 1925, and C. L. Patch took specimens for the National Museum in Lanark and Frontenac counties between Kingston and Ottawa in the summer of 1931. The cottontail was first reported around Ottawa in 1931 and the first authentic specimen was killed by a dog at McKay Lake, Rockcliffe Park, Ottawa, February 14, 1932, and the species has been fairly common since that time on both sides of the Ottawa, but has not penetrated very far into the Laurentian Hills on the Quebec side of the Ottawa River. The Mearns Cottontail became common in the vicinity of Montreal about the same time, but it is not known whether the cottontails in the region south of Montreal came in by spreading along the St. Lawrence River from Ontario, or whether they spread from a large "planting" of cottontails on the west side of Lake Champlain in the northern part of the State of New York. As far as we know this is the only part of Canada where artificial introduction of cottontails near the border may have been a factor. Otherwise in Eastern Canada the spread seems to have been a gradual infiltration accompanying the clearing of the land incidental to farming operations which at the same time made conditions less favourable for the indigenous "bush rabbit," "snowshoe rabbit" or varying hare, *Lepus americanus virginianus* Har-

lan, which is well known for turning white in winter.

The writer has examined several specimens of cottontail from southeastern Quebec, and all were referable to *S. f. mearnsii*. The writer knows of no authentic records of the New England Cottontail, *Sylvilagus transitionalis* (Bangs), but Nelson (1909, 198) stated that the New England Cottontail was extending its range northward in southern Vermont and New Hampshire, and F. L. Osgood<sup>2</sup> stated that this species has spread rapidly northward during the past forty years, and at the present time it ranges to the Canadian border on the west side of the State and on the east side at least to Montpelier. The New England Cottontail has presumably moved across the border into parts of the "Eastern Townships" of Quebec, and it is only a question of time when somebody will establish an official Canadian "record" of the species.

The Nebraska Cottontail, *Sylvilagus floridanus similis* Nelson, was first recorded from Canada by Stuart Criddle (*Can. Field-Nat.*, 1929, 159) from a single specimen caught three miles north of Treesbank, Manitoba, February 11, 1914, and determined by Dr. H. H. T. Jackson of the U.S. Biological Survey. In 1927 J. D. Soper was informed by D. W. Yuill, barrister, of Melita, Manitoba, that he had seen several cottontails and secured one in the woods along Souris River near Melita, and that others had been taken by sportsmen in the same region. The writer was informed in 1928 by Norman MacKellar, a farmer of Clearwater, about 135 miles southwest of Winnipeg, 12 miles north of the International Boundary, and about 40 miles east of Turtle Mountains Forest Reserve, that the cottontails had recently come into that region, first appearing in 1925. By 1932 the species had become a pest in the nurseries of the Experimental Station for Southern Manitoba, Department of Agriculture, and four specimens were sent to the National Museum by Superintendent W. H. Leslie in December, 1932. The Nebraska Cottontail Rabbit has spread with remarkable rapidity for a small mammal species. Vernon Bailey<sup>3</sup> states that no

1. The Rabbits of North America, N. A. Fauna, No. 29, 1909, 171.

2. The Mammals of Vermont, Journ. Mammalogy, Vol. 19, No. 4, 1938, pp. 435-441.

3. A Biological Survey of North Dakota. Mammals. N. A. Fauna, No. 49, 1925, 135.



trace of this species was found in North Dakota in 1887, nor nearer than Fort Sisseton, South Dakota, and Browns Valley, Minnesota, but they had reached Larimore, N.D., in 1900, and Walhalla, near Pembina, close to the Manitoba International Boundary in 1912. From the time of its first appearance in Manitoba in 1914, the range of this Cottontail has extended to the northwest as far as Dauphin, 250 miles from the International Boundary. The rapid extension of the range of this brush-loving mammal is apparently because it could not find food and shelter on the bare prairies which were swept by prairie fires before the sod was broken up for farms. With the farmers came shelter-belts, weed-patches and brush in the coulees and the cottontails speedily followed. It may be noted that on the prairies the cottontails are more apt to become a pest by concentrating in the sparse shelter-belts and gnawing young fruit trees and shrubbery, than in the East where there is usually enough natural "bush" to accommodate a large rabbit population without doing much damage except in towns.

The National Museum has no actual records of this species being taken in the Province of Saskatchewan, but from the history of its rapid spread over North Dakota and southwestern Manitoba, there seems little reason to doubt that this is the "Cottontail" recently reported from parts of southeastern Saskatchewan.

Recent records of "Cottontails" from Saskatchewan should be carefully sifted, as there is another species of cottontail, the Black Hills Cottontail, *Sylvilagus nuttallii grangeri* (Allen), found in the dry regions of southern Alberta and southwestern Saskatchewan, probably indigenous, and recently reported to be increasing and extending its range in some districts. The first published record of this cottontail in Canada was given by Nelson (1909, pp. 204-7), who gives its range "... extends north of the United States into southern Alberta and Saskatchewan, Canada. Zonal range mainly Transition and upper half of Upper Sonoran." Nelson definitely records one specimen from Cypress Hills, Saskatchewan.

The first specimen of the Black Hills Cottontail in the National Museum of Canada was taken by C. H. Young, September 4, 1917, near Steveville, Red Deer valley, Alberta. Chas. H. Sternberg reported that the cottontails were fairly common in the same region in 1919, but in previous years they were rare, only one or two seen each season. J. D. Soper reported in 1922 that a clerical friend had shot several cottontails

about 30 miles southeast of Calgary, and another man had also killed them in the same region. In 1927, Mr. Soper found remains of one on the trail a few miles east of Cardston, Alberta, near St. Mary's River, which is more or less wooded along the banks. He was also informed by Henry Webster that cottontails occurred in the willow flat near his place on Deer Creek, near Sweet Grass Hills. Mr. Soper took four specimens at Deer Creek, Alberta, July 13-19, 1927. They were said to occur in the Eagle Butte region of the western escarpment of the Cypress Hills, in Alberta, but none were seen during a stay of about ten days, although signs were observed.

Our first National Museum record of the Black Hills Cottontail from Saskatchewan was a male taken by H. M. Laing at Eastend, June 15, 1921. J. D. Soper collected four August 21-24, 1927, near Eastend, where they were comparatively common on the Potter ranch, resorting to thorn thickets near Frenchman River and in draws leading to the higher bench lands. The species was more rare at Val Marie, found in willows along Frenchman River where one specimen was taken September 2. Two were seen and one collected at Lonesome Butte on Rock Creek south of Wood Mountain in a brushy draw among the buttes on September 16. Only one was seen and collected at Big Muddy Lake, where they were obviously scarce, on September 23, 1927. This one was sunning itself before a hole in the side of a naked clay butte along the Waniska coulee. The latter is the most eastern record in Canada as far as known. Three specimens were obtained from Charles F. Holmes, taken January 8, 1924, near Dollard, between Eastend and Shaunavon. Laurence B. Potter wrote in 1933 that the Black Hills Cottontail had noticeably increased in the vicinity of Eastend since the beginning of winter 1931-32, and H. F. Hughes of Shaunavon wrote in 1933 that they were also increasing in that region, and were often seen out on the prairie. F. Bradshaw, former director of the Provincial Museum, Regina, wrote in spring of 1933, that H. W. McCrae, of Crestwynd, Sask., a few miles east of Johnston Lake, had seen a little brown rabbit that spring in the same environment as the common varying hare, in the brush along the lake. Mr. Bradshaw stated that this was the most northerly point of Saskatchewan from which the cottontail rabbit had been recorded to his knowledge. This record is only about 50 miles northeast of our Lonesome Butte record, and from physiographic reasons is presumably *S. n. grangeri*, but with this species working north and east, and *S. f. similis* moving

north and west, it is evident that naturalists should use care in reporting "Cottontails" as determined specifically without careful examination of specimens. Although Snowshoe Rabbits (*Lepus americanus*) occur in most of the regions where cottontails have been reported in Canada, there is no difficulty for anybody to recognize them in winter, as the snowshoe rabbit is white in winter and the cottontail is brownish or grayish at all seasons.

Rabbits are difficult to describe briefly, as they are dull coloured, without noticeable markings, and measurements are not always dependable for identification on account of differences due to age and individual variation. A few of the differentiating characters are given:

#### EASTERN FORMS

**MEARNS COTTONTAIL.** *Sylvilagus floridanus mearnsii* (Allen). A large cottontail, with top of head and back pale pinkish buffy, sometimes with ochraceous tinge, and always darkened by the overlying and usually strong wash of black; rump dull iron gray. Average measurements of five adults (Nelson, 1909): Total length, 446 mm. (17.6 inches); tail vertebrae, 60 (2.4 inches); hind foot, 104 (4.1 inches); ear from notch in dried skin, 54.3 (2.15 inches).

**NEW ENGLAND COTTONTAIL.** *Sylvilagus transitionalis* (Bangs). Upper parts of head and body usually bright pinkish buffy, varying to a deeper almost ochraceous buffy heavily overlaid with a black wash, the latter coarsely dis-

tributed and giving the effect of black streakings or pencilings; top of head with a narrow black patch between ears; rump patch obsolete. Average measurements of five adults (Nelson, 1909): Total length, 388 (15.3 inches); tail vertebrae, 39 (1.6 inches); hind foot, 95 (3.8 inches); ear from notch in dried skin, 51.6 (2.05 inches).

#### WESTERN FORMS

**NEBRASKA COTTONTAIL.** *Sylvilagus floridanus similis* Nelson.—A pale coloured form, smaller than *mearnsii*, and much more grayish, especially on head; ears shorter and distinctly paler; legs paler and more cinnamon than *mearnsii*; under side of neck paler and more grayish buff. Measurements of five adults (Nelson, 1909): Total length, 408 mm. (16.1 inches); tail vertebrae, 52 (2.1 inches); hind foot, 99 (3.9 inches); ear from notch in dried skin, 50 (1.9 inches).

**BLACK HILLS COTTONTAIL.** *Sylvilagus nuttallii grangeri* (Allen).—A considerably smaller animal than the Nebraska Cottontail, with upper parts creamy buff lightly grizzled with grayish or brownish instead of blackish hairs; back and sides of lower part of hind legs varying from rather dark rusty cinnamon to a pale rusty cinnamon, shading into pale dull rusty along outside of hind feet. Average measurements of five adults (Nelson, 1909): Total length, 352 mm. (13.9 inches); tail vertebrae, 44 (1.7 inches); ear from notch in dried skin, 55.7 (2.2 inches).

## THE GENOTYPE OF CONULARIA

By G. WINSTON SINCLAIR



**ABSTRACT:** The type species of the genus *Conularia* is shown to be *C. quadrisulcata* Sowerby, a species from the Silurian rocks of Great Britain. A new subgenus, *Paraconularia*, is proposed for shells of the type of *Conularia inaequicostata* DeKoninck.

Various authors, most recently Leriche (p. 58)<sup>1</sup> and Fletcher (p. 241), have pointed out that the type species of the fossil genus *Conularia* has been generally misconceived. The recent revision of the Conularida by Bouček (1939, p. A113 *et seq.*), with his erection of subgenera, gives a present importance to the question.

The problem concerns the identity of the species *Conularia quadrisulcata* Sowerby, and its relationship to *C. sowerbyi*. The pertinent history of these two species follows.

The name *Conularia* was first used for this group of fossils in 1821, when Sowerby (p. 107) defined the genus and described and figured two new species, *C. quadrisulcata* and *C. teres*. The latter has been shown to be a cephalopod and need not concern us further. The former name was applied to four specimens, all illustrated on plate 260, figures 3-6. Following his specific diagnosis Sowerby said: "The above description is taken from a very perfect specimen (fig. 4) found by the Rev. R. B. Plumbtree of Gloucester, in transition Lime-

1. All page references in brackets refer to the works cited at the end of this paper.

stone, who gave it to Mr. Miller, it is the only one in which I have seen either a septum or the inflected lips." The original of figure 3 was also from the "transition" limestone, and it, according to Slater (p. 33) belongs to the species later described by Salter as *C. subtilis*. Figures 5 and 6 represent specimens from the carboniferous.

There can be no doubt that the species, and consequently the genus, was based on the original of figure 4, a specimen of Silurian age. Sowerby credited the names "*Conularia*" and "*C. quadrisulcata*" to the manuscript catalogue of "Mr. Miller, of Bristol." However it does not appear that they have any standing except as of Sowerby 1821. All the specimens used by Sowerby seem to have been lost.

In 1825 Blainville (p. 377) introduced the name *C. sowerbyi*, which he attributed to Defrance. This name was applied to exactly the same fossils which Sowerby had described as *C. quadrisulcata* and *C. teres*, and all Sowerby's figures were reproduced as plate xiv, figures 2a-e. Seventeen years later deVerneuil (p. 348) proposed that the name *C. quadrisulcata* be restricted to the Carboniferous form described by Sowerby, and that *C. sowerbyi* Defrance be used for the Silurian species. DeVerneuil gave a good figure and description of his *C. sowerbyi*, from a specimen from the Silurian of south-western Russia. Most recent authors have followed Slater's suggestion and referred to '*C. sowerbyi* deVerneuil 1845.' There are two objections to this usage, the first being that if deVerneuil's interpretation of the species be accepted, deBlainville's name is not available for it. The other, which has been generally overlooked, is that the specimen described and figured by deVerneuil is not the same as the English species from the Wenlock beds, to which Slater applied the name.

Sandberger in 1847 (p. 8 *et seq.*) gave diagnoses and diagrammatic figures of all the species of *Conularia* known to him, at the same time proposing new and more descriptive specific names. Thus *C. creni-jugata* was substituted for *C. sowerbyi* deVerneuil; *C. cancellata* for Sowerby's Silurian *C. quadrisulcata*; and *C. tuberi-costa* for the British Carboniferous *C. quadrisulcata*. Of these names *C. cancellata* has been used by some Swedish authors; the others have not been accepted, but may be useful.

In 1902 Reed (p. 122) described and figured the species *C. clavus* which Salter had listed in 1873 (p. 153). Slater (p. 26) considered this to be the same species as *C. quadrisulcata* Sowerby, which

name she applied incorrectly to the British Carboniferous species.

Boucek (1928) in his revision of the Bohemian *Conulariae* divided the genus into a number of groups, and more recently (1939, p. A121) has carried the division a step further by removing some species to new genera and by erecting four new subgenera in the genus *Conularia*. Of these subgenera *Conularia* s.s. is based on *C. quadrisulcata* (erroneously considered as a Carboniferous species) and *Plectoconularia* is based on *C. sowerbyi* deVerneuil.

This history may be summarized in the statement: The genus *Conularia* has as genotype *C. quadrisulcata* Sowerby 1821, a British Silurian species with which *C. Sowerbyi* deBlainville 1825 and *C. cancellata* Sandberger 1847 are synonymous; *C. creni-jugata* Sandberger 1847 (= *C. sowerbyi* deVerneuil 1845) is a Russian Silurian species closely allied to the genotype; *Plectoconularia* Boucek 1939 is a synonym of *Conularia* Sowerby 1821.

Leriche (p. 58) has pointed out that the name *C. tubericosta* Sandberger is available for the British Carboniferous species described by Slater as *C. quadrisulcata*; Reed's name *C. clavus* might also be considered. However, it is understood that the British Carboniferous *Conularids* are being re-studied, and the question of the proper name for this form may well be left to those working with the actual specimens.

It does not seem necessary at the present time to discuss the subgeneric division of the genus. The writer is engaged in a study of the American *Conularida*, and the question will be dealt with in connection with that work. In order to avoid confusion, it is proposed to supply a name at this time for the group '*Conularia* s.s.' of Boucek (1939, p. A122).

Boucek's division of the genus may therefore be amended as follows:

Genus *CONULARIA* Sowerby 1821, Type, *C. quadrisulcata* Sowerby 1821; Wenlock, England. Transverse ridges distinct, close, tuberculated; the spaces between them crossed by prominent bars or striae. No longitudinal septa on the faces of the shell. (*C. niagarensis* Hall 1852 is an American species closely resembling the genotype.)

#### ~~Subgenera:~~

*Paraconularia* nov. Type, *Conularia inaequicostata* deKoninck 1883; Carboniferous, Belgium. (Annales, Musée Royal d'Histoire Naturelle

*de Belgique*, viii: p. 223, pl. liv, 9-11. The type specimen is preserved in the Museum in Brussels.) Shell usually large; transverse ribs strong, distant, faintly tuberculated, bending abruptly towards the aperture at the corner grooves; longitudinal striae rarely present, never well developed; mid-line of the faces indicated only by the change in direction of the transverse ribs. (*C. blairi* Miller & Gurley 1894 is a well known American species which belongs to this group.)

*Archaeoconularia* Boucek 1939. Type, *Conularia insignis* Barrande 1867; Ordovician, Bohemia. "Secondary longitudinal lines feebly developed; sculpture fine, arched." (Boucek) (It is not certain that this group is represented in America.)

*Mesoconularia* Boucek 1939. Type, *Conularia fragilis* Barrande 1867; Lower Devonian, Bohemia. "No secondary lines; ribs distinct, visible to the naked eye, undulating." (Boucek) (*Conularia roeperi* Miller & Gurley 1896 is of this group.)

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## NOTES AND OBSERVATIONS

ICELAND GULL AT FORT WILLIAM, ONTARIO.—On December 26, 1939, while taking the Christmas Bird Census, four members of the Thunder Bay Field Naturalists' Club, Kenneth Eoll, Claude Garton, Jack Lowcock, and the writer, visited the Imperial Fur Farm, west of Fort William, to observe a large flock of gulls, whose presence in the region at that late date was probably attributable to the mild and open winter. It was estimated that 200 gulls were present, all but one of which were Herring Gulls. The exception stood out in marked contrast to the other gulls and was readily identified as an Iceland Gull, *Larus leucopterus*. Its smaller size was carefully noted when compared both in flight and at rest with that of the Herring Gulls. The smaller size of head and neck was also noted, leading to the conclusion that the bird was an Iceland Gull and not a Glaucous Gull. The plumage was the nearly pure white of a second-year bird.

There are relatively few records of the occur-

rence of the Iceland Gull in Ontario, and these are for the Lower Lakes. There are no reports for Manitoba. One specimen has been collected in the adjacent State of Minnesota, a bird in the plumage of the second-year, obtained August 10, 1931, 12 miles north-east of Grand Marais on the north shore of Lake Superior. (Roberts: *The Birds of Minnesota*. Vol. 1, p. 542, 1936.) Grand Marais is 85 miles south-west of Fort William.—A. E. ALLIN.

THE CRESTED FLYCATCHER IN CENTRAL ALBERTA.—On July 16, 1939, at Elk Island National Park, some forty miles east of Edmonton, Alberta, the writer was rather surprised to hear the notes of a Crested Flycatcher. During subsequent days the bird was heard on several occasions in the poplar bush, and on July 23 single birds (possibly the same individual) were twice seen on Long Island

in Astotin Lake, a mile or so north of where this Flycatcher was first noted.

Mr. T. E. Randall, who has been observing birds in the Park for some time, informed me that he had never detected the species there.—R. D. USSHER.

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**CHESTNUT-BACKED CHICKADEE IN THE ALBERTA FOOTHILLS.**—On November 12, 1939, the writer was observing a mixed flock of Black-capped, Gambel's, and Brown-headed Chickadees in Lodgepole Pines near the headquarters of the Kananaskis Forest Experiment Station, Seebe, Alberta, about forty miles west of Calgary.

The notes of one dark looking bird attracted attention, and when examined through glasses, it proved to be a Chestnut-backed Chickadee. The bird was watched for some time, coming within a few feet on more than one occasion. The writer has had little time for observations here, and this is the only time this Chickadee has been noted.

The altitude is about 4,300 feet and Gambel's Chickadee was not observed during the previous May and June, being first seen in early November, on the writer's return to the Station.

The prevailing forest cover is mostly Lodgepole Pine of rather small size, with patches of Poplar and some Spruce, practically all second growth.—R. D. USSHER.

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***Placocephalus kewensis* IN MANITOBA.**—*Placocephalus kewensis* was first noticed in the greenhouse of the University of Manitoba in September, 1933, during the annual search for breeding *Oniscus*. Its introduction has no doubt been with nursery stock as has been the case throughout America and Europe coming originally from Samoa.

*Placocephalus* von Graff has recently been changed to *Bipalium*, eight species of which are now recorded from Java, Sumatra and Bali. *Bipaliidae* have flat elongated bodies (4 to 8 inches) with dorsal stripes, and a broad placate head with marginal eye spots.—V. W. JACKSON.

**SPREAD OF NEBRASKA COTTONTAIL IN MANITOBA.**—Nebraska Cottontail (*Sylvilagus yoridamus similis*) has now crossed Latitude 52° in Manitoba and possibly 53° in Saskatchewan. Anthony gave its northern limit as Fargo, North Dakota, in 1924. In 1926 the first specimen for Manitoba was sent from Kaleida. In 1928 many had reported "a brown rabbit in midwinter" and in 1930 it had reached Winnipeg. January 1932 Joe Morton reported it 100 miles north and on November 11th that year Peter Durant sent in a specimen from Dauphin, 200 miles north. So this sudden migration northward was very rapid, nearly 100 miles a year. Since reaching Latitude 52° the spread has been general throughout the Province but not farther northward. Has the Eastern Cottontail made a similar advance?—V. W. JACKSON.

—————

1. Records of "cottontails" from Saskatchewan should be carefully investigated, as the Black Hills Cottontail, *Sylvilagus nuttalli grangeri*, has been known to occur in Saskatchewan for at least 30 years, and is known to be increasing and spreading in some areas.—R. M. ANDERSON.

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**OCCURRENCE OF GRAY SQUIRREL IN MANITOBA.**—Gray Squirrels are quite a novelty on the streets of Winnipeg this winter. They first crossed the Manitoba boundary from the south in 1930<sup>1</sup>—perhaps the first wave of retreat from the inter-specific war said to have been raging at the time,—when thousands of squirrels swam the Mississippi. 3 years later they were in St. Boniface and young ones were seen that summer. They have now spread northward to East Selkirk and to Latitude 51° and westward to Portage la Prairie and the Pembina ridge, i.e.—the Red River valley. They are darker than the eastern Gray Squirrel less white below and their furry tracks prove them to be the Merriam or Minnesota Gray Squirrel (*Sciurus carolinensis hypophaeus*).—V. W. JACKSON.

—————

1. The National Museum of Canada has one skin in the black (melanistic) phase, taken near Sewell, Manitoba, in November, 1916, but in the absence of further details an isolated occurrence of a common caged pet might be considered as an "escape."—R. M. ANDERSON.

## REVIEWS

NATURAL HISTORY OF THE BIRDS OF EASTERN AND CENTRAL NORTH AMERICA.—By Edward Howe Forbush; revised and abridged with the addition of more than one hundred species by John Richard May; illustrated in colour by Louis Agassiz Fuertes, Allan Brooks and Roger Tory Peterson; Houghton, Mifflin Company, Boston 1939; pp. xvi-554, with 97 coloured plates; 16 mo. \$4.95.

Forbush's great work *Birds of Massachusetts and other New England States* is an ornithological classic, but its three volumes are no longer in print, and, even when they were, the price was beyond the ordinary purse, though better value was seldom given. The present volume is a condensation of Forbush's three volumes, with the addition of enough species to make it apply to the whole of eastern North America. This extension is carried out also in the coloured plates by the addition of four new plates.

The text as it stands is a list of subspecies, (geographical races), with similar headings for each race and nothing to point out species to the amateur. The reviewer is moved to protest the infliction of such a system on the ornithological laity for whom the book is supposed to be intended. When it was tried on some friends interested in birds but lacking scientific training it proved even more confusing than was feared. Fortunately the plates are captioned with species names.

The literary value of the book is high. All of Forbush's finer passages are preserved, and Dr May and his associates maintain the same high standard. Peterson's birds are also worthy of association with those of Fuertes and Brooks. Rarely is so fine a bird book, or, indeed, a book of such distinction in any field, offered at so low a price.—C.H.D.C.

ANNUAL REPORT OF THE FOREST INSECT SURVEY, 1939, *Division of Entomology, Science Service, Department of Agriculture, Ottawa, 1940.*

The Forest Insect Survey, a co-operative project based on the regular collection of field samples of forest insects, is now in its fourth year, and has grown until it involves the collection of 8,310 samples by more than 2,000 co-operators. It is understood that co-operators are supplied with collapsed cardboard containers that can be set up in a few seconds, and have merely to collect a sample, for which operation explicit instructions are supplied, and to place it in the mail.

The report, which contains fourteen maps and an elaborate, but understandable, table, summarizes the distribution and abundance of forest insects in Canada. A series of these reports (this being the first to be printed) will be invaluable to ecologists, and the Survey is of vital importance to our forest industries.

During the summer of 1939 certain forest insects, notably the Spruce Budworm, destroyed immense quantities of timber. A casual reader, mindful of the much-publicized salvage operations that followed the destruction of timber by a recent hurricane in New England, will look in vain for any hint of salvage for the timber of the insect-devastated areas of Canada: Our forest economy is the economy of abundance.

A glance at the array of insects dealt with inspires the prediction that some species or other will reach epidemic numbers in any given year, at least for a good many years.—C. H. D. C.

HOW TO KNOW THE TREES.—by H. E. Jaques, 1940, pp. 152, many illustrations, published by the author, 709 N. Main St., Mt. Pleasant, Iowa; Spiral binding \$1.00, cloth \$1.80.

This little book is a key to the trees of United States and Canada east of the Rockies, with a brief description of each species and marginal drawings showing leaves, fruits and twigs and a map of the range. The trees as a group lend themselves admirably to this type of treatment, and the result is a very useful little manual. Apparently there is no perfect key, but once the precise meaning of key characters are established by use this one will be found to be quite workable.—C. H. D. C.

DUCKS UNLIMITED (CANADA), CENSUS, 1938 and 1939, and *Kee-man Record Book*—pp. 50, n.d., many illustrations. (Ducks Unlimited (Canada), T. C. Main, General Manager).

This interesting document contains an estimate of the duck population of the interior of Canada, with a description of the methods by which it was made, notes on duck populations, a discussion of the causes of loss of waterfowl, an outline of the restoration program of Ducks Unlimited, and a guide to the identification of waterfowl.

The duck population of the interior is estimated at 59,682,000, these figures apparently applying to the end of the 1939 breeding season, and may be contrasted with an estimated 40,500,000 for 1935. It is an estimate, not a count, made by "Ducks Unlimited" to the best of their ability with a vast amount of information to help them. The population of some species is still alarmingly low, and, looking at the grand total, one is reminded that the bison are said to have numbered 60,000,000 at one time. We wonder just how close we came to losing all our ducks in the last decade. The duck hunters of 1939 far outnumber the bison hunters of 1870, and the killing privileges extended are still so generous that if they could take full advantage of them one season would see the end of the ducks.

Most persons know that marshes and sloughs have dried up by hundreds on the prairies, but the loss of aquatic habitats in the forested area between the prairies and the pre-Cambrian shield is not so familiar. This loss has been brought about by forest fires and by the destruction of beaver. Deterioration is so remarkably out of proportion to population that we are told, (p. 26) "Anyone who has flown over this area cannot fail to be astonished that so few people could do such great damage to such a vast area in such a short period of time."

The Ducks Unlimited program is stated to consist in impounding water, prevention of drying-up of key ponds, fencing, fire control, predator control on breeding grounds and planting of duck foods. Details of individual projects are not given.—C. H. D. C.

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THE REPTILES OF ONTARIO.—By E. B. S. Logier;  
Published under the Reuben Wells Leonard  
Bequest, The University of Toronto Press,  
1939; pp. 63, with 2 charts and 8 plates, .35c.

In the "Foreword" to *The Reptiles of Ontario* Mr. Logier says, "The purpose of the present handbook is mainly to serve as a guide to the reptiles occurring in Ontario rather than as a natural history of them. Special attention has therefore been given to the keys and descriptions to keep them simple and yet comprehensive enough, and the illustrations were prepared with particular reference to the features discussed in them. The introductory account "Concerning reptiles in general" was written to give to those less familiar with the study of reptiles a general idea

of the kinds of animals which are included in the term "reptile" and to point out some of the important features of the group. Throughout, the work has been kept as non-technical as is consistent with a reasonable understanding and accurate diagnosis of the forms in question."

The "Introduction" gives general data concerning reptiles—differences from amphibians, meaning of cold-blooded, body form and specialization, food and methods of feeding, killing of prey by snakes, venom apparatus of snakes, defence of harmless snakes, tongue, senses, shedding of skin and reproduction.

The keys to the snakes and the turtles are based on easily seen external characters, and refer to the plates for a clearer picture.

A description is given of the range, size and structure, colour and habits and habitat of the one lizard, eighteen snakes and nine turtles known to occur in Ontario.

The two charts give the subdivisions and the counties and districts referred to in the text. The eight plates contain fifty-one splendidly drawn figures from the pen of Mr. Logier.

*The Reptiles of Ontario* is in reality a handbook of the reptiles of eastern Ontario and the adjacent portion of the United States. This book, with *The Amphibians of Ontario* also by Mr. Logier, should be owned by teachers, students, campers and everyone from Manitoba to the Atlantic and from James Bay southward through Vermont and Michigan who may be interested in animal life.

Congratulations to E. B. S. Logier and the Royal Ontario Museum of Zoology on a perfect publication, the first of its kind and one that will stand unsurpassed for many years.—C. L. P.

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TURTLES OF THE UNITED STATES AND CANADA,—By Clifford H. Pope: Alfred S. Knopf, Inc., New York, 1939; pp. 343, with 99 halftone photographs, \$3.75.

In *Turtles of the United States and Canada*, the only complete account of American turtles, Mr. Pope has set down all that is known today about these extremely interesting creatures. The first chapter deals with origin and relationships, structure, size, the sexes, reproduction, the egg, young, longevity, hibernation, food, enemies, intelligence, relation to man and care in captivity. Subsequent chapters give precise information on identification, distribution, habits, economic value,

habitats and other data concerning the sixty-three land, fresh-water and sea turtles inhabiting North America. The ninety-nine unsurpassed photographs were mostly taken especially for this book. *Turtles of the United States and Canada* should be available for reference wherever nature study is taught, and may well be greatly treasured by everyone interested in nature.—C.L.P.

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ON MELOSPIZA MELODIA IN ONTARIO.—By J. H. Fleming and L. L. Snyder. *Occasional Papers of the Royal Ontario Museum of Zoology*, No. 5, Toronto, Ontario, University of Toronto Press, February, 28, 1939.

This is a critical examination of the races of Song Sparrow of Ontario based upon some 439 specimens from well distributed localities in the Province.

The conclusions arrived at are, that the hitherto regarded prairie form *M.m. juddi* Bishop extends

through northern Ontario eastward to a line from eastern Lake Superior to the foot of James Bay.

The type form of the species, *melodia*, (Wilson) is based upon a winter specimen assumed to have been taken at Philadelphia, Pennsylvania, and some doubt exists as to its area of breeding origin. Analyzing the evidence, birds of eastern Canada, Nova Scotia westward to central Ontario are referred to this form. It intergrades with *juddi* across a broad belt from between Georgian Bay and Temagami to the above line.

The area bordering Lakes Erie and Huron are occupied by a third race that is referred to *euphonia* Wetmore, *beata* Bangs being regarded as a synonym of *juddi*, with more or less intergradation along its boundaries with *melodia*.

It is eminently satisfactory that these rather slightly differentiated races of a common and familiar bird have at last been cleared of the migratorial and intergrading confusions that have hitherto obscured their distributions within the Province.—P.A.T.



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# THE CANADIAN FIELD-NATURALIST



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# The Canadian Field-Naturalist

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No. 6

## TRIASSIC OF BEATTIE HILL, PEACE RIVER FOOTHILLS, B.C.\*

By F. H. McLEARN

\*Published with the permission of the Director, Mines and Geology Branch, Department Mines and Resources, Canada.



BEATTIE HILL is situated on the north bank of the river, at the west end of Beattie flat, about 20 miles west of the Peace River canyon, in the middle of the Peace River foothills.

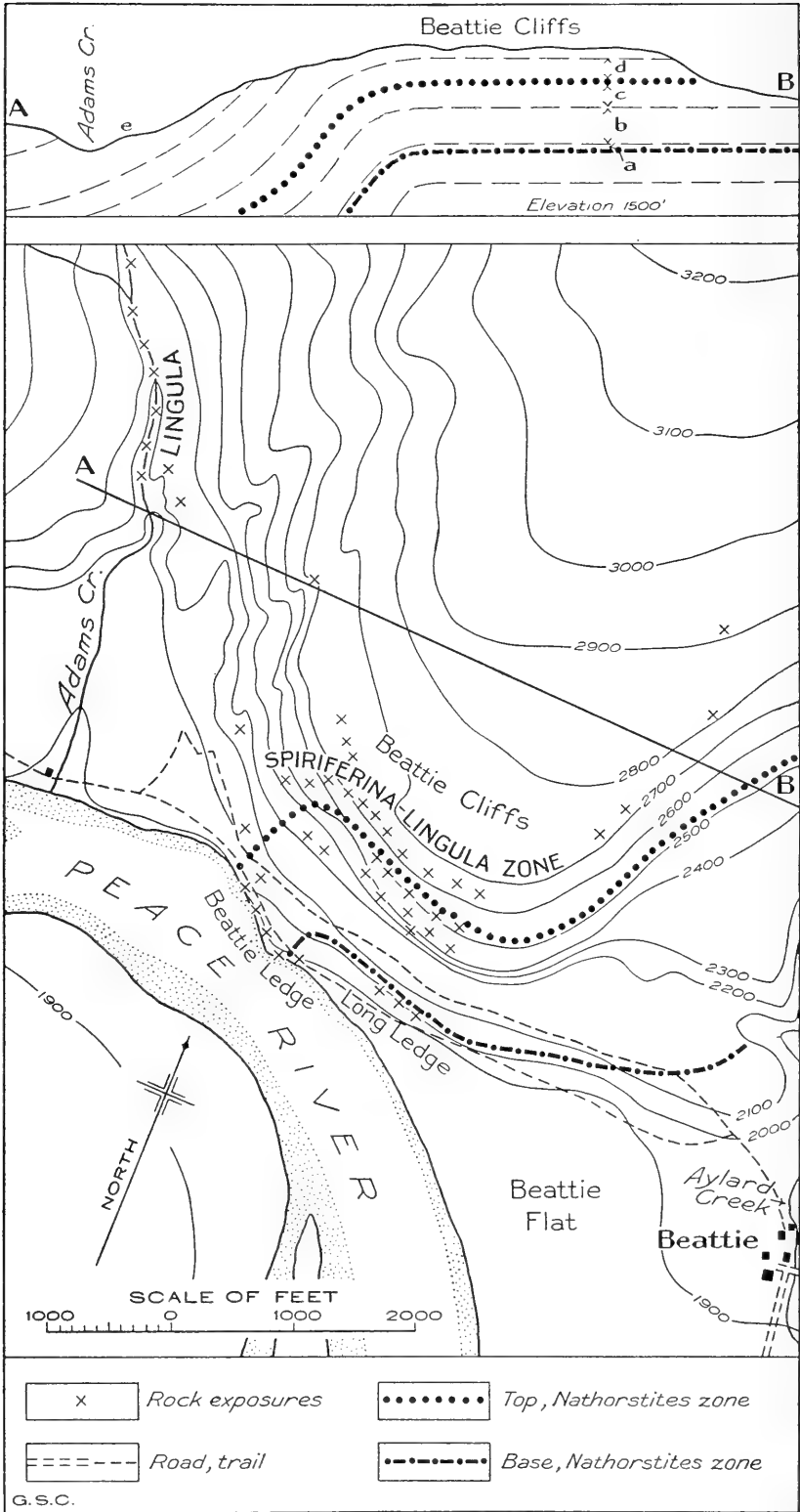
The exposures of the Triassic Schooler Creek formation at this locality are of interest both to the stratigrapher and to the collector of fossils. For here the beds with the *Nathorstites* fauna are better exposed than at any other place in the foothills and here also they yield the greatest variety of fossils. This locality, moreover, is readily accessible being near the Beattie farm, close to the river and on the site of the proposed highway through the foothills and mountains.

Fossil collections from Beattie hill were first made in 1917 and by the writer. Since then other collections have been made by M. Y. Williams, C. M. Sternberg, the writer and others. The lists incorporated in this paper have their source almost entirely in the writer's collections. All records of field relations are based solely on the writer's observations. The contour map which forms the base for figure 1 was prepared by the late F. A. Kerr. A. H. Bell, C. R. Stelck, A. J. Childerhose and others have assisted in the collection of fossils.

This fossil locality escaped discovery by A. R. C. Selwyn in 1875 by what appears to have been a mere chance. In the late afternoon of July fifteenth of that year, going downstream in the course of his exploration of the Peace River valley, he seems to have passed by the Beattie hill. He did, it is true, note the structure, "two sets of rock, the one horizontal in the hills, the other nearly vertical at the waters edge" (See his map at h), but since he did not recognize the monoclinical structure, had no exact knowledge

of the lithology and recorded no fossils, it is inferred that he did not land. Continuing on for nearly two miles he camped for the night on the north bank of the river near the present boat landing on Beattie flat, with the purpose of examining on the next morning a ledge on the opposite bank of the river. So he missed the opportunity of discovering the *Nathorstites* fauna of the Peace River foothills, with its interesting ammonoids and it remained unknown for 42 years. The next morning he crossed the river and examined the ledge on the south bank. A few brachiopods were obtained, but they could hardly compare with the splendid assemblage of fossils at the Beattie ledge, which he had unwittingly overlooked.

Beattie hill is the southern end of a nearly flat-topped spur between the valleys of Adams and Aylard creeks, on the north side of the river. It is about 900 feet high and overlooks Beattie flat and the river (See figure 1). The southern face is truncated and steep. The high slopes of this face are fortified with flat lying, precipitous ledges, the Beattie Cliffs (See figure 1), stepped back in rocky, curving benches and simulating from some angles the walls of a coliseum or Martello tower. The middle slopes of this southern face are covered mostly with sand and gravel, carved into narrow and irregular benches, with high, steep fronts or margins, all that remain of what were once high and broad terraces. Near the base, at the east end of this face and bordering the west end of Beattie flat, is a long, low, but precipitous and rocky ledge, with flat-lying strata, the Long ledge (See figure 1). At the base, at the west end of this face, and washed by the river are the west dipping strata of Beattie ledge (See figure 1). From the west end of this ledge rise several sloping rocky ribs, high up on the west part of this southern face. Thus the section exposed at the south end of Beattie hill reveals an internal monoclinical structure (See profile, figure 1). The



east limb is flat or nearly flat and the west limb fairly steep.

The west slope of Beattie hill is fairly steep, is nearly a structural slope and is, in places, ribbed with west-dipping ledges. Similarly dipping strata occur in low cliffs and ledges on Adams creek.

The section is as follows:

	Feet
Mostly grey, thickbedded, calcareous sandstones and siltstones and rare, impure limestone with rare <i>Lingula</i>	
Mostly grey, mostly thickbedded, massive, but also shaly and slabby, calcareous, very fine sandstones, siltstones, and impure shelly limestones and silty limestones with <i>Lingula selwyni</i> Whiteaves, <i>Spiriferina onestae</i> , <i>Coenothyris petriana</i> , <i>C. silvana</i> and <i>Monotis montini</i>	800
Upper <i>Nathorstites</i> bearing beds with lithology similar to the above. A non-fossiliferous, calcareous siltstone tested contains 25 percent insoluble matter. Some beds are barren; brachiopods predominate in some fossiliferous beds, pelecypods in others. Ammonoids are comparatively rare. The fauna includes <i>Spiriferina onestae</i> , <i>Coenothyris silvana</i> , <i>C. petriana</i> , <i>Hermesia? woyaniana</i> , <i>Monotis montini</i> , <i>Daonella nitanae</i> , <i>Ostrea</i> , <i>Anomia</i> , <i>Pecten tranquillanus</i> , <i>Pecten</i> n. sp. <i>Pinna</i> sp., <i>Myoconcha cawriensis</i> , <i>Modiolus ahsisi</i> , <i>Pleuromya</i> . <i>Nathorstites</i> cf. <i>mcconnelli</i> Whiteaves and <i>N. cf. mcconnelli</i> var. <i>lenticularis</i> Whiteaves	200
Mostly non-fossiliferous, dark grey, somewhat shaly, slabby, laminated and massive, calcareous siltstone and silty limestone	200
Lower <i>Nathorstites</i> -bearing beds, including dark grey and brownish grey, somewhat carbonaceous, shaly to thinly slabby, thin-bedded, impure, shelly limestone, silty limestone and impure, shelly limestone and calcareous siltstone. An impure, silty, shell limestone chemically tested contained 15 per cent insoluble matter and another impure limestone with few shells, 25 per cent. Compared with the upper <i>Nathorstites</i> bearing beds, these are of a darker colour, somewhat more carbonaceous, on the average of somewhat finer grain, and more thinly bedded. The fauna includes <i>Spiriferina onestae</i> , <i>Coenothyris silvana</i> , <i>C. petriana</i> , <i>Monotis montini</i> (rare), <i>Daonella nitanae</i> , <i>Modiolus ahsisi</i> (rare), <i>Nautilus</i> sp., <i>Isculites schooleri</i> , <i>I. schooleri</i> var. <i>parvus</i> , <i>Lobites pacianus</i> , <i>Nathorstites</i> , cf. <i>mcconnelli</i> , <i>N. cf. mcconnelli</i> var. <i>lenticularis</i> , <i>Sagenites gethingi</i> , <i>Nitanoceras selwyni</i> ,	300

*Proarcestes* sp., *Silenticeras hatae*, *Sirenites meginiae*, *Protrachyceras sik-anianum*, *P. zauwae*.

30

Non-fossiliferous, somewhat shaly or slabby, dark grey, calcareous siltstone and impure limestone

40

Concealed

50+?

Somewhat carbonaceous, well laminated to almost fissile, calcareous siltstone, with very fine, light and dark colour banding, with rare, poorly preserved *Daonella* and what appear to be worm burrows.

40

The basal, laminated siltstones are flat-lying in the Long ledge. The forty feet of non-fossiliferous siltstone occur as steeply west dipping beds at the easternmost end of Beattie ledge. The lower *Nathorstites* beds overlie them near the east end of the same ledge. The 300 feet of mostly barren siltstones occupy all the central part of Beattie ledge. The upper *Nathorstites* beds include steeply west dipping strata at the west end of Beattie ledge and flat-lying strata in the lower ledges of the high Beattie cliffs. The beds with *Lingula*, *Spiriferina*, etc. include flat-lying strata in the higher ledges of Beattie cliffs and west dipping strata on the west slope of Beattie hill. The yet higher calcareous, fine sandstones and siltstones with rare *Lingula* dip to the west along Adams creek.

Higher strata are concealed below sand and gravel in the higher slopes west of Adams creek.

The *Nathorstites* fauna thus occurs locally in two zones. The lower contains mostly ammonoids and the upper rare ammonoids together with numerous pelecypods and brachiopods. The brachiopods and the pelecypod, *Monotis montini*, extend beyond the stratigraphic range of the *Nathorstites* and other ammonoids and persist in higher beds, where they are associated with *Lingula selwyni*. Finally all but the *Lingula* disappear.

The fossils mentioned above have been described in several papers in this journal (See October 1937, December 1937, and November 1939).

Collectors can obtain interesting fossil specimens at this locality. The ammonoids are most abundant in the lower *Nathorstites* beds near the east end of Beattie ledge. *Nathorstites* is easily identified by its sharp venter. *Protrachyceras* is ornamented with numerous nodes and clavi. *Sirenites* is compressed and finely ribbed; clavi or nodes border the ventral sulcus. *Silenticeras* is compressed, almost smooth and has

a ventral sulcus. *Nitanoceras* is a small, dwarfed, nearly smooth shell. The amateur will have difficulty in separating the *Lobites* and *Isculites* in this fauna. Both have smooth, swollen, inner whorls. In the (*Isculites*) species at this locality nearly all of the ultimate whorl is effected by the umbilical enlargement, whereas in *Lobites* only a small part of the ultimate whorl is so effected. The faint ribbing on the last whorl of the *Lobites* species is somewhat unlike that of the *Isculites* species and the different suture lines form a basis for separation of the two genera by the palaeontologist.

The correlation and external relations of the *Nathorstites* fauna are discussed elsewhere (e.g. see paper now in press, *Trans. Roy. Soc. Canada*. 3rd ser. Sec. IV, vol. 34, 1940). *Nathorstites* has a boreal distribution, being found on the Liard river, in Alaska, Spitzbergen and the Kotelnny islands. The *Lobites* shows some resemblance

to a species at Timor, Dutch East Indies. The age is late Meso- or very early Neo-Triassic.

#### HILL, EAST OF AYLARD CREEK

Beds similar to the upper *Nathorstites*-bearing beds on Beattie hill are exposed on the hill east of Aylard creek. They contain a similar fauna: *Spiriferina onestae*, *Coenothyris silvana*, *C. petriana*, *Hoernesia? woyaniana*, *Monotis montini*, *Myophoria (Elegantinia)* cf. *urd* Boehm. *Lima* cf. *austriaca* Bittner, *Modiolus ahsisi* and *Nathorstites* cf. *mcconnelli* var. *lenticularis* (Whiteaves).

Figure 1. Plan and profile of Beattie hill. In the profile *a* is local Lower *Nathorstites* zone, *b* the barren beds, *c* the local Upper *Nathorstites* zone, *d* the beds with *Spiriferina*, *Lingula* etc. and *e* beds with rare *Lingula*. All elevations are approximate.

## ANIMAL PREDATION

By J. A. MUNRO<sup>1</sup>



THE SIGHT of one animal killing another animal causes an emotional reaction in the observer, of a kind and strength proportionate to the size of the victim, its attractive qualities, its position in the animal world and the circumstances under which it was killed. The sight of a bluebird catching a housefly or a meadow lark tearing the legs from a grass-hopper cause only interested comment but the capture of a chickadee by a sharp-shinned hawk awakens emotions of a more positive kind. Nevertheless the act of predation in each case does not differ in essentials.

Man unconsciously humanizes the other animals. He attributes to them cruelty, vindictiveness, hate, meanness, fear, bravery and cowardice, not realizing that these are but vague terms conveying different meanings to different persons and applicable to man only.

As man interprets animal behaviour on the basis of human psychology so also is he impelled to judge animal behaviour on the basis of an abstraction called justice and to mete out reward or punishment.

Thus, in the case of the bluebird and the meadow-lark man extends his benevolent protection to "good birds" which, incidentally, serve his human needs. In the case of the sharp-shinned hawk, a "bad bird", he feels it is necessary to punish. Not a little of the current attitude towards predators can be ascribed to this human ideal of "justice" which impels man instinctively to defend the weak against the strong, to reward those whose actions are thought commendable and to punish those whose actions are thought evil.

It is not realized that "killing" is an unsocial act only in human communities and that in other animal communities it is vital to existence.

Evolution in human society through the ages has established the concept of an ideal and orderly human relationship; an ideal which influences all of us to a greater or lesser degree. It has created social laws and customs many of which thwart biological laws as they apply to human survival.

It is right that man should thus seek to mitigate the harshness of nature as it applies to man but it is wrong to extend this benevolence

<sup>1</sup> Chief Federal Migratory Bird Officer



in lavish manner to other animal species. Man as well as other animals may suffer from such action.

The killing of the weak for the benefit of the strong, the survival of those best fitted to survive, the balance in animal numbers brought about through various complex forms of relationship is still the law of the animal world in which man is an intruder at all times.

Predation is an integral part of the machinery by which all animal populations, from the amoeba to the higher vertebrates, are made to function. The predator-prey relationship has evolved together with the evolution of species and the establishment of balanced animal populations. It is governed by laws of which the functions and the results can be seen although the actual mechanism itself is hidden, one which

*" . . . the world's coarse thumb  
and finger failed to plumb."*

It has been argued that balanced animal communities no longer exist because of serious human intervention. In the sense that man has greatly altered the constituents of these communities, and changed the physical characters of much of the world, this is true. Nevertheless it also is true that nature unaided is forever striving to heal these scars, to set up a new balance, to assist the operation of biological laws which work for the benefit of all animals no matter how far from the original state their habitat may be.

Further intervention in the form of unscientific control of predators in general may be decidedly harmful or, at least, an unnecessary sacrifice of wild life.

In a completely protected area such as a garden, or small patch of woodland, or some similar

area, it has been demonstrated that a summer population of small birds can be increased by improving the environment and by killing the predators which prey upon small birds. Such action may be necessary and commendable in a sanctuary for small birds but to practice this intensive bird farming over the country as a whole is an entirely different matter. Even if such a condition is desirable, and many will say it is not, the physical difficulties in the way of such a scheme are insurmountable. In comparison with a garden, or other similar sanctuary, many large areas of country-side are greatly diversified as to habitat and consequently the kinds of animals inhabiting them are many and varied. Thus there is room for biological laws to function successfully and for animal populations over a period of years to attain a stability best fitted for all concerned.

The practice of predator control in a large area may start with the destruction of one particular species and, should this not produce the expected results, proceed from that to the destruction of one after another suspected species until the entire balance of life has been upset.

An important contribution to the question of predation has been made by a scientist in connection with his studies of ruffed grouse, rabbits and grey squirrels, all of which are cyclic; that is to say they are subject to periods of abundance followed by periods of scarcity. It was discovered that over a four year period, when these particular animals were abundant the population on a protected area, where predators were destroyed systematically, was no greater than the population on an area of comparable size and character where the animals were not protected and organized predator control was not carried on.

## CHIEF FACTOR JAMES ANDERSON'S BACK RIVER JOURNAL OF 1855

(Continued from page 67)

Sund. 17th. Left very early in hopes of finding a clear road; we were soon, however, undeceived, as after pushing through much drift ice and injuring the canoes much, we were brought to a stand by thickly packed ice, in the bay at a short distance from Pt. des Roches.<sup>46</sup> Foggy, with some showers of rain; were the wind to blow off shore, I think that we could get on as the ice is in pieces and moving. Mosquitoes awful. The net only produced 2 fish. Shot a goose.

Mond. 18th. Got off at mid-day and, after 5 hours hard labor in getting thro' the ice, reached Pt. des Roches. Got a few gulls eggs.<sup>47</sup> Weather warm, with thunder. Mosquitoes awful. Set the net. The bay beyond the point quite blocked up.

Tues. 19th. At 7 p.m. yesterday a slight land breeze drove (June, 1855, *Big Island to Resolution*—11—) the ice from round the point and left a channel. The net was instantly raised and we started—the channel, however, only extended a mile. We then began to bore through the ice and at last found a fine open channel which with many bars of ice took us to Hay River;<sup>48</sup> afterwards we bored through a great deal of ice with occasional lanes of water and reached here after being 23 hours on the water (6 p.m.). We are encamped on a stony islet about 2 miles from the Sulphur Springs.<sup>49</sup> Much to my surprise, the Lake here seems much stronger than towards Big Island. The floes seem unbroken, white and hard; we shall require a breeze of wind ere we can start, as it is impossible to get through such ice. The canoes suffered much damage. We have been troubled with perpetual fogs for the last 3 days. Much of the ice yesterday and today covered with sulphur.

46. Pte. des Roches—On south shore of Great Slave lake, about 13 miles from Hay River Post, shown on map of Great Slave Lake, Western Sheet, Department of Interior, 1928. (M.G.C.).

47. Several species of gulls are found on Great Slave Lake cf. Preble loc. cit. (P.A.T.).

48. On south shore of Great Slave Lake, 234 miles from Simpson. (M.G.C.).

49. These springs were reported near Sulphur Point by R. G. McConnell, Geological Survey, as early as 1888. Sulphur Point is shown on the map of Great Slave Lake, Western Sheet, Department of Interior, 1928, and lies about 43 miles west of Resolution. (M.G.C.).

Wed. 20. About 5 a.m. a breeze sprung up which cleared a channel outside; it ran far out, but I could not see whether it approached the Presque Isle. I, however, (June, 1855, *Big Island to Resolution*—12—) determined on venturing and after breaking some ice, we fortunately reached the Presquile, after which we got pretty clear water to Les Isles aux Mort.<sup>51</sup> A head wind put us ashore on one of les Isles Brules<sup>52</sup> for *Resolution* 3 hours. We then started and reached the house<sup>53</sup> about 10 1/2 p.m.

Thurs. 21. Gave the men their advances and prepared for starting. Calm and warm.

Fri. 22. Last night and most part of the day blowing a gale from sea, which has undoubtedly cleared our road, as we can see large bodies of ice—with the naked eye—driven in. In the evening we made a start<sup>54</sup> and encamped a little beyond the small channel. Mosquitoes awful.

Sat. 23rd. Left at 3 A.M. but could not get beyond Rocky Island,<sup>55</sup> owing to strong head wind. The *Resolution* canoes excessively leaky. Set 2 nets in the evening.

50. This is Pte. Presquile, about 8 miles east of Sulphur Point. (M.G.C.).

51. Ile du Mort, as shown on the Western Sheet of the map of Great Slave Lake, Dept. of Interior, 1928, 27 miles from Resolution. A party of Dogribs are said to have been chased here and starved to death long ago by their southern neighbours. (M.G.C.).

52. The largest of these now shown as Burnt Island on the Western Sheet of Great Slave Lake Map, Dept. of Interior, 1928, 18 miles from Resolution. (M.G.C.).

53. Fort Resolution, 309 miles from Simpson. (M.G.C.).

54. *The Illustrated London News* of Nov. 3, 1855, p. 525, has an interesting account of the departure from Resolution complete with sketch from which one sentence may be quoted: "The evening on which the expedition took its departure was fine and calm, and the three canoes, accompanied by another from the fort, swept swiftly and lightly over the unruffled surface of the lake, to the inspiring strains of numerous paddling songs—"La belle Rose," "La claire Fontaine," "Les trois Soldats," "La Bergère;" and numerous other choice specimens of the north-west muse awoke the wild echoes of the Moose-deer Island, and swept over the waters until the woods upon the mainland responded to the song."

55. Stony Island, shown on Sheet 7, Eastern sheet of Great Slave Lake, Department of Interior, 1932, 22 miles from Resolution. (M.G.C.).

CREWS<sup>56</sup>—12-A

- |    |                     |         |
|----|---------------------|---------|
| 1  | Baptiste            | } Bow   |
| 2  | Ignace              |         |
| 3  | Joseph              |         |
| 4  | Thomas Mistigan     | } Steer |
| 5  | Alfred Laferte      |         |
| 6  | John Fidler         |         |
| 7  | Mur. McLellan       |         |
| 8  | Ham Fisher          |         |
| 9  | Edward Kipling      |         |
| 10 | Don McLeod          |         |
| 11 | George Daniel       |         |
| 12 | Joseph Bouché       |         |
| 13 | Will Reid           |         |
| 14 | Paulet Papino Keish |         |
| 15 | Jerry Johnson       |         |
| 4  | Copper Indians      |         |
| —  |                     |         |
| 19 |                     |         |

## June, 1855—SLAVE LAKE—13

Sun. 24th. About 4 a.m. the wind lulled and we made a start, but it soon arose again and we were driven ashore at Pt. des Roches<sup>57</sup> (whence we take this Traverse)<sup>58</sup> where we remained all day. The nets set yesterday produced only 6 fish; they cannot be set here owing to the immense quantity of drift-wood which lines the shore.

56. Some of these men were recommended by Dr. Rae (Parliamentary Report, 1855, p. 849) who gives their names as Thomas Mistegan, Murdoch McLellan, John Fidler and Henry Fidler. Alfred Laferte was sent back sick from Muskox Rapids, and the Indians also did not go farther than the head of Back River. In his letter to Sir George Simpson as published in the Further Papers, 1856, p. 26, Anderson lists his men as Bte. Assinijuntion, Ignace Montour, Joseph Anarize, Thomas Mistegon, Paulette Papanakies, John Fidler, Henry Fidler, Edward Kipling, George Daniel, Donal M'Leod, Jerry Johnston, Joseph Boucher, Murdo' MacLellan and William Reid.

However, a photostat copy of this letter in the Lands, Parks and Forests Branch Library shows the names to have been written. Baptiste Assinijuntion, Ignace Montour, Joseph Anarize, Thomas Mistegon, Paulet Papehkinaisse, John Fiddler, Henry Fiddler, Edward Kipling, Donald M'Leod, George Daniel, Irving Johnston, Joseph Bouche, Murdo M'Lennan, William Reid. The men are listed again on July 13. Several names vary in spelling, but it would seem that some variations are mistakes on the part of the copyist, e.g., "Ham. Fisher" for what obviously must have been "Hen. Fidler," and "Janice Montours" for Ignace Montour." Although Anderson usually spells the name of his lone Canadian "Bouche," it would seem that "Boucher" is correct, as is also McLellan, rather than McLennan.

57. Grant Point, shown on Sheet 7, Eastern sheet of Great Slave Lake map, Dept. of Interior, 1932, formerly known as Pte. des Roches, 34 miles from Resolution. (M.G.C.).

58. An open water crossing where the canoes had to leave the shelter of land.

Mon. 25th. Unable to move from our *Slave* campment. Blowing a heavy gale all day, *Lake* with no appearance of its abating. An

Indian here says that his band follow a road from near this Mountain<sup>59</sup> to Lake Aylmer; it is through a chain of small lakes with many portages—6 of them long ones. I wished to follow this road, but unless I can get an additional information shall adopt another which they all represent as longer but perfectly safe and with few portages. This falls on the east of L. Artillery, near the Rat Lodge.<sup>60</sup>

Tuesday 26th. Detained still by wind; this delay is most distressing. The men shot a goose, some ducks and gulls. I was in hopes that the Esquimaux Interpreter, (*June, 1855, Slave Lake—14—*) might have overtaken us here; had this occurred I should not have regretted this detention.

Wed. 27th. The wind fell a little after 4 a.m. and we started immediately. Just after making the traverse it began to blow from the N.E. harder than ever, but we felt little of it among the numerous Islands of

Group,<sup>61</sup> but in making some of the Traverses, the canoe shipped water. The evening is delightfully calm and serene. We are encamped about 8 miles from Pt. Keith,<sup>62</sup> at 8 1/2 p.m. The view from a high rock near our encampment is of extraordinary beauty. On this rock was a nest (last year) of a Fishing Eagle<sup>63</sup> composed of sticks, hay and moss. Set 2 nets. Saw some Canada Geese<sup>64</sup> with their young ones. I may here add that Back's<sup>65</sup> description is generally correct, and that I do not intend to repeat his descriptions—I however think that he has estimated the height of the Rocks too highly.

59. There is a small hill at Grant Point, but it is thought that the "mountain" referred to is at the point of embarkation from Slave lake, where the real difficulties begin and which is evidently constantly on his mind. (M.G.C.).

60. The Rat Lodge lies on the west shore of Artillery lake. (M.G.C.).

61. A letter from the Hudson's Bay Company already referred to indicates that this reads "Simpson's Group of Islands" in the Journal in their Archives. Reference to the map of this group as shown on the eastern sheet of the map of Great Slave Lake, Dept. of the Interior, 1932, shows that Anderson is probably following the Inconnu Channel. (M.G.C.).

62. The south-westerly tip of Keith Island shown on the Eastern sheet of Map of Great Slave Lake, Department of Interior, 1932. This was shown as a point on Sir George Back's map and named by him. (M.G.C.).

63. Probably osprey, *Pandion haliaetus* (P.A.T.).

64. *Branta canadensis*. (P.A.T.).

65. Reference cited in footnote 5.

Thurs. 28th. A fine day with one or two showers. Wind rather strong ahead. Back mentions that the rocks are from 200 to 2000 feet in height; the highest estimate that both Mr. Stewart and myself have formed is 500 feet,<sup>66</sup> and (*June, 1855, Slave Lake—15—*) this is only in one or two instances; his descriptions otherwise are correct. The Cut Rocks (Trap etc.) strikingly resemble those in Nipigon Bay, Lake Superior.<sup>67</sup> 3 peaks indistinctly seen by Back in the bay between Pethenent<sup>68</sup> and the East coast, I perceive are portions of a considerable Island. There are many Islands along the East coast not noticed in the map. Many plants are now in flower, but they are all to be found in the valley of the McKenzie. I have therefore collected only a few of the rarest.<sup>69</sup> We left our encampment at 3 a.m. and encamped at 9 p.m. at the N.E. end of Tal, thet,la<sup>70</sup> (a strait which does not freeze during the winter)<sup>71</sup> on an island called the "Bag." Our nets produced 8 White fish and a very fine trout;<sup>72</sup> they were set again tonight. We met with a little ice in this strait, and I fear we shall be stopped tomorrow as it appears unbroken in the distance. I saw an eagle's<sup>73</sup> nest; the young eagles were peering over the edge.

Frid. 29th. Young ice formed last night and we could not leave till the sun had some effect on it and the (*Slave Lake—16—*) old ice which when

cemented together is as strong as ever. We embarked at 6 a.m. and after breaking through some ice put on shore at high rocky island<sup>74</sup> where we remained till 12 o'clock, then made a move but after proceeding two or 3 miles put on shore again, as the ice was still too strong. Starting again at 3 p.m. The ice was now breakable and we found occasional pools of water. We managed to reach a small stream about 15 or 16 miles from the Mountain portage,<sup>75</sup> a road leading to the Barren Lands and L. Aylmer. Back rejected this route as impossible, but as it is the only chance we have of reaching the Thleury-cho<sup>76</sup> in time to descend to the sea I have determined on adopting it. The head of the lake is still firm and the other lakes (Artillery,<sup>77</sup> Clinton, Colden,<sup>78</sup> etc.) will probably be still unbroken. This mountain route is a chain of small lakes with many portages. Our nets produced nothing. It was curious to see the men at this date on the ice chopping a road. Mr. Stewart took a meridian altitude where we breakfasted which gave 62° 47' 11" Latitude.<sup>79</sup>

*June, 1855, Slave Lake—17—*

Sat. 30. Calm and clear. The ice froze in a mass last night and we could not attempt to leave before 2 p.m.; it is thicker than what we saw yesterday and bore the men easily; it was from 1 to 2½ feet thick; by dint of chopping and pushing pieces apart we made about 3 miles when it became so thickly packed that I could not venture to proceed further without risking the destruction of the canoes. We encamped at

66. Carl Lausen reported in a report of a geological reconnaissance of the east end of Slave Lake, 1928, that a small lake on the crest of Kahochella peninsula was approximately 1000 feet above the main lake. (M.G.C.).

67. The two formations are actually very similar. In both cases the trap rock is diabase.

68. Must be Pethei Pen., the long peninsula separating McLeod bay and Christie bay shown on Eastern sheet, Great Slave Lake Map, Department of Interior, 1932. (M.G.C.).

69. These specimens were apparently pressed in the original note book and were in it when it was exhibited to the Senate Committee of 1888. One specimen from Big Island was identified by Prof. John Macoun as Golden Saxifrage (*Chrysosplenium tetrandrum*), and another from the Arctic Coast as the Arctic Willow, *Salix arctica*.

70. Shown as Taltheilei Narrows on Eastern Sheet of Great Slave Map, Department of Interior, 1932; approximately by canoe travel, 140 miles from Resolution and 450 miles from Simpson. Correspondence from the Hudson's Bay Co., already referred to, indicates that it is spelled Tal-thel-la in the Journal in their Archives. (M.G.C.).

71. Due to reversing currents caused by seiches. Compare A. E. Persild, Geogr. Review, 22: 474-477 (1932), where seiches are recorded from Great Bear Lake. (A.E.P.)

72. White fish, *Coregonus clupeaformis*; Trout, *Cristivomer namaycush*. (J.R.D.).

73. Both Golden and Bald Eagles, as well as the Osprey, sometimes called Fish Eagle, are found in this region. (P.A.T.).

74. This island is not identified but is probably one of the small islands just at the northeast entrance to Taltheilei Narrows. See Eastern sheet, Great Slave Lake, Department of Interior 1932. (M.G.C.).

75. There is some ambiguity here as the mountain portage, according to his mileage and hours elapsed, lies at least thirty miles further on. He may be referring to Mountain River route followed by Pike in 1890. See Eastern Sheet Great Slave Lake (M.G.C.).

76. Wrongly transcribed from Thlewy-cho (Thlewee-cho Dezeth or Great Fish River); explored by Back in 1833; subsequently named Back River after him. (M.G.C.).

77. Named by Sir George Back after the 6th Battalion of Royal Artillery. See Lockhart River Basin Sheet, Department of Interior 1928. (M.G.C.).

78. Clinton-Colden Lake, Named by Back "as a mark of respect to the memory of those distinguished individuals, DeWitt Clinton (1769-1828) and Cadwalladar David Colden (1769-1834), American lawyers and statesmen". See Lockhart River Basin Sheet, Department of Interior, 1928. (M.G.C.).

79. This latitude would put them about the mouth of Akaitcho river, Eastern sheet Great Slave Lake; actually it is thought that they are at the mouth of Mackinlay river. (M.G.C.).

5 p.m. within sight of our last encampment. The men went to hunt but nothing was killed except a goose and a white partridge;<sup>80</sup> the latter had only half its plumage changed. At 6 p.m. Ther: in the air shaded 59—; in water near the shore 39—. Our nets yielded nothing. On account of the ice none were set tonight.

Sunday July 1. The wind arose (N.E.) rather fresh and by driving away the ice permitted us to leave. We made about 2 miles and were again driven ashore till half past 3 when by breaking through some ice we got paddling till 9 p.m. (breaking occasionally through ice) when we were brought to a stop by an impenetrable pack-opposite Kah-oo-chellah<sup>81</sup> or Rabbit Point. The wind blew very fresh from (Slave Lake—18—) 2 to 7 o'clock and has broken up the ice which had not previously moved. The rocks on the mainland (W'y) are higher than any we have seen, the ascent is sloping; I think that the highest does not exceed 700 feet. Most of the rocks are in a state of disintegration; they appear to be of granite and trap; the process is easily seen, the rocks are in layers of about five feet thick; the upper layer is split into quadrangular pieces; water enters into these cracks, freezes and splits off the outside one, so that at last the whole of the under layer—which is perfectly rounded and smooth—is covered with these rocks. In process of time the angles are work<sup>82</sup> off and they have much the appearance of boulders. This may explain why boulders—apparently—are found on high mountains—without having recourse to either water or ice<sup>83</sup>. The islands are apparently of trap and resemble very much those in Nipigon Bay; they have many peaks with a cut face to the north. The water is of immense depth even close to shore. Only a few ducks and geese are seen, and a chance gull and a few small birds. I have not seen the Cypress (Bankivan Pine)<sup>84</sup> since leaving Resolution. We passed two insignificant streams today.

(From Slave Lake to Lake Aylmer—19—)

Monday, July 2, 1855. Obligated this morning to make a portage  $\frac{1}{2}$  mile previous to embarking, after which we only met with two bands of ice. We embarked at 3 a.m. and reached the "Moun-

tain Portage"<sup>85</sup> at 8 $\frac{1}{2}$  a.m. We passed one insignificant stream about 2 miles from the portage and another falls into the Bay where the portage commences. This portage is an ugly business—it is almost a continual ascent for over 1500 feet.<sup>86</sup> In the first place a portage of about  $\frac{1}{2}$  mile is made to a pond of about a mile in length which I have named . . . . .<sup>87</sup>

Another portage is then made (over these mountains) of about 3 miles to a small lake now named . . . .<sup>87</sup> The whole of the loadings with the canoes were rendered by 10 p.m. and the men are now laughing over their day's work! ! ! The general direction of our route today about N.W.Wd. Lat. of the head of the portage 63° 46' 19" by a Meridian observation of Mr. Stewart's.<sup>88</sup> Moostigues or sand flies and mosquitoes dreadfully annoying.

(July, 1855, Slave Lake to Lake Aylmer—20—)

Tues. 3rd. The men only got to bed about 11 $\frac{1}{2}$  o'clock last night; I therefore allowed them to sleep till 6 $\frac{1}{2}$  a.m. We crossed a small lake<sup>89</sup> (about  $\frac{1}{2}$  mile across) and made a portage to another lake about 3 miles in length. From the top of one of the highest mountains perhaps 1000 feet above the level of Slave Lake, I had a fine view of that body of water (there seems still to be a good deal of ice in it) and counted no less than 15 small lakes or tarns. The interior is inconceivably rugged and desolate. The mountains are riven in every shape. Only a few dwarf spruce and birch<sup>90</sup> are to be seen, and scarcely

85. The exact jumping off place of this old portage route into the Barren Lands from Great Slave Lake has not been located. It would probably depend to some extent, on ice and wind conditions on Great Slave lake, because there are several possible routes leaving Great Slave Lake and converging to a common route at a short distance inland. The route depicted on the accompanying sketch is thought to be probably most used. (M.G.C.).

86. This ascent for over 1,500 feet refers to the vertical distance above Great Slave lake (M.G.C.).

87. In several places it will be noticed that Anderson stresses the fact that he has named some feature. Apparently he must have prepared a sketch on which these would be recorded. Unfortunately it has not been found possible to locate this sketch, if such existed, (M.G.C.).

88. There is an error in this latitude as 63° 46' 19" would put the position about 50 miles too far north. His general direction is described as N.W. Wd., which is interpreted as compass bearing, which would put him a little west of North astronomically. (M.G.C.).

89. See sketch map No. 1 (M.G.C.).

90. *Picea glauca* or *Picea mariana*; *Betula papyrifera* or *Betula glandulosa*. (A.E.P.).

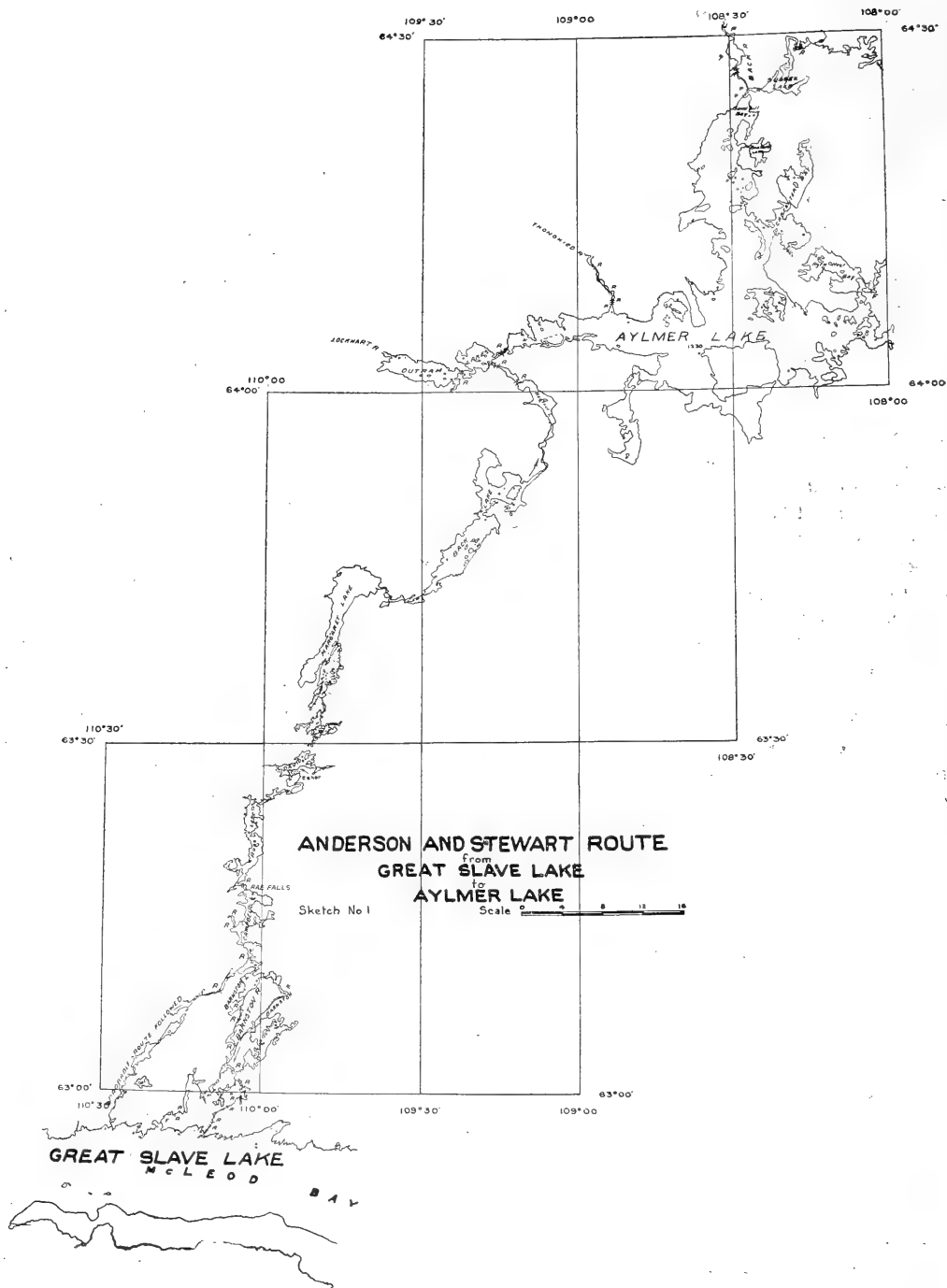
80. Ptarmigan, *Lagopus* sp. (P.A.T.)

81. Probably Gibraltar Point. See Eastern Sheet, Great Slave Lake (M.G.C.)

82. Probably should be worn.

83. V. C. Wynne-Edwards, in Trans. Roy. Soc. Can., 33:1-7 (1939) has recently elaborated this theory. (A.E.P.).

84. Jack Pine. *Pinus Banksiana* (A.E.P.).



even a bird to enliven the scene. Labrador Tea<sup>91</sup> is in full flower and some berries<sup>92</sup> are nearly full size. The first portage was about a mile in length, and, of course, from the steep ascents and the ruggedness of the country, very fatiguing. We then made 2 short portages and crossed 2 small tarns; we then made a portage of about  $\frac{3}{4}$  mile which, tho' it had some steep ascents, was less rugged than the others. It is thickly carpeted with Reindeer Grass,<sup>93</sup> and from their

vestages appears to be a favourite haunt of those animals.<sup>94</sup> This brought us to a lake where we encamped at 7 $\frac{3}{4}$  p.m. as the men tho' in (July, 1855, *Slave Lake to Lake Aylmer*—21—) good spirits seem pretty well done up with their last 2 days exertions. Set 2 nets as the Lake is said to abound in Trout.

(To be continued)

91. *Ledum groenlandicum*. (A.E.P.).

92. Probably crowberry, or *Empetrum nigrum*, the earliest berry to ripen in that district. (A.E.P.).

93. Probably *Cladonia sylvatica*, commonly called "reindeer moss". (A.E.P.).

94. Barren Ground Caribou, *Rangifer arcticus*. (R.M.A.).

## NOTES AND OBSERVATIONS

PIPISTRELLUS HIBERNATING IN ONTARIO.—On February 25, 1940, search of a small limestone cave at Rockwood, Wellington County, Ontario, yielded two hibernating bats, both of which were male pipistrelles, probably *Pipistrellus subflavus obscurus*. These specimens have been deposited in the Royal Ontario Museum of Zoology, Toronto.

The pipistrelle has been reported but twice previously in Ontario—at Ottawa, July 10, 1890, by Saunders (1920), and at Niagara-on-the-Lake, May 14, 1933, by Downing (1938). It is found in the states south of Lake Ontario and Lake Erie, and has been reported hibernating at South Bass Island, Ohio, just a few miles from Ontario's southernmost point by Hitchcock (1940). It seems not unlikely that the species is commoner and more widely spread in Ontario than records would indicate.

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HAROLD B. HITCHCOCK.

KEITH REYNOLDS.

RUFFED GROUSE ON GRAND MANAN ISLAND.—Grand Manan Island, lying some 6 miles off the mainland, in Charlotte County, New Brunswick, is now (1940) well populated with Ruffed Grouse (*Bonasa umbellus*) but prior to 1925 none was to be found there. The present pleasing state of affairs is the result of an effort which was made by Reverend H. C. Mullen, who at that time was stationed at Seal Cove, Grand Manan. When Mr. Mullen was transferred to Grand Manan from his parish in Nova Scotia, he missed the familiar springtime "drumming" of the cock grouse, with which he was so familiar in his native province, whereupon he arranged for the importation of 9 birds from Nova Scotia where they had been trapped. These were liberated on October 29, 1925, at a point about one mile northwest of the village of Seal Cove and it is from these that the present population has sprung. The foregoing is taken from my permanent records and in which I find the following notation:

1933. "From reliable sources reports are received telling of a very satisfactory increase of Ruffed Grouse over the whole of Grand Manan Island."

For some years past there has been an open season on Grand Manan for the hunter of these birds and good sport has been enjoyed.—ROBIE W. TUFTS.

THE RUFFED GROUSE AND ISLAND POPULATIONS.—On receipt of the above note the ornithological editor turned to his records. He finds the following in his notes from Harrold Herrick, Birds of Grand Manan, Bulletin Essex Institute, V, 1873, 28-41: (Quotation may not be verbatim.)

"*Bonasa umbellus*. Rare. At North Head, June 29, I flushed a fine male but was unable to shoot him. I was sorry for this as the inhabitants insist that the grouse is never found on Grand Manan."

This substantiates Mr. Tufts' statement of the general absence of the species from the island in earlier days but demonstrates that stray specimens could and did occur. The only source of supply would be the mainland nearly six miles away over open sea. That a Ruffed Grouse could or would make such a sustained flight is interesting especially as indicative of the powers and limitations of the species to populate isolated habitats. It seemed well to look up its success or failure to reach other island masses with the following results.—

It failed to establish itself on Newfoundland requiring a flight of 45 miles from St. Paul's Island, or Anticosti, 20 miles from the Mingans. Neither does it seem to have reached Isle Royale in Lake Superior, 15 miles off shore, or the Queen Charlotte Islands, 35 miles off the coast of British Columbia. Prince Edward Island, requiring a flight of only 10 miles, was well populated. The Spruce Grouse seems to have shown the same possibilities and limitations but it is interesting to note that the Sharp-tailed Grouse, with greater tradition of migration has reached Isle Royale and the big powerful Sooty Grouse the Queen Charlottes where in both cases the Ruffed Grouse has failed. Probably ten miles is about the limit of over-water crossing of the species. Even the six miles, more accurately 5.79 miles, to Grand Manan was probably made too rarely for two of opposite sex to meet there to inaugurate permanent population.—P.A.T.

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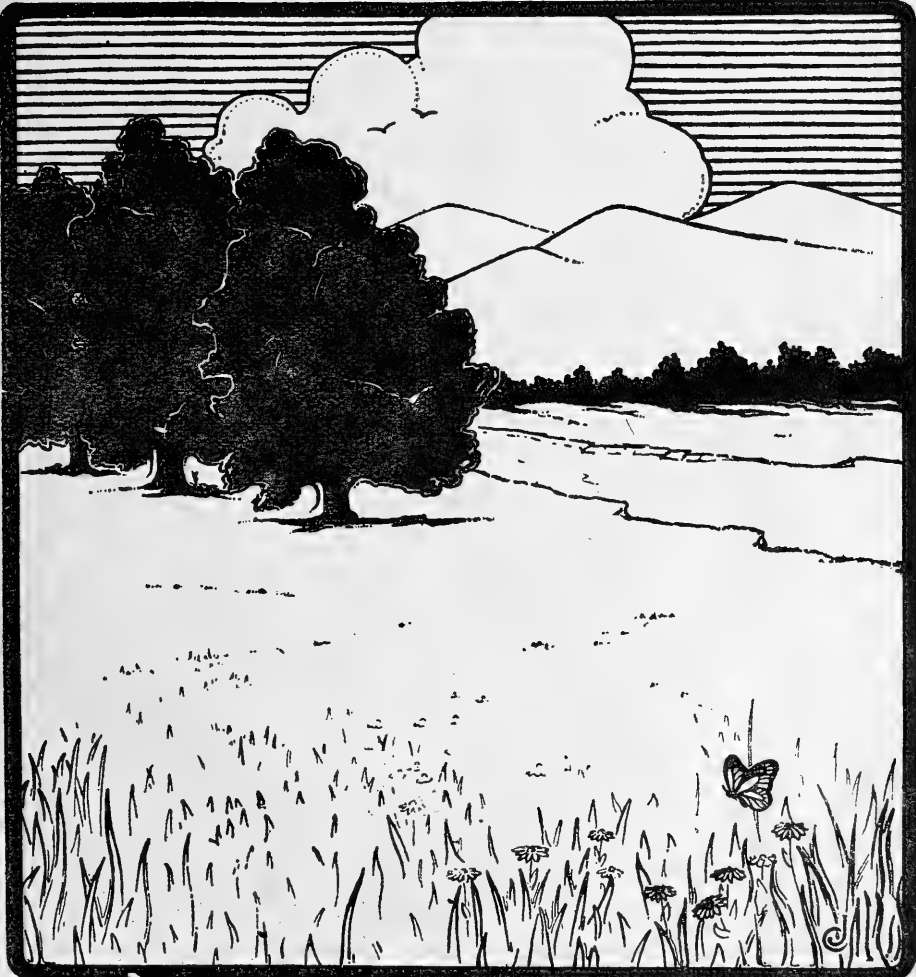
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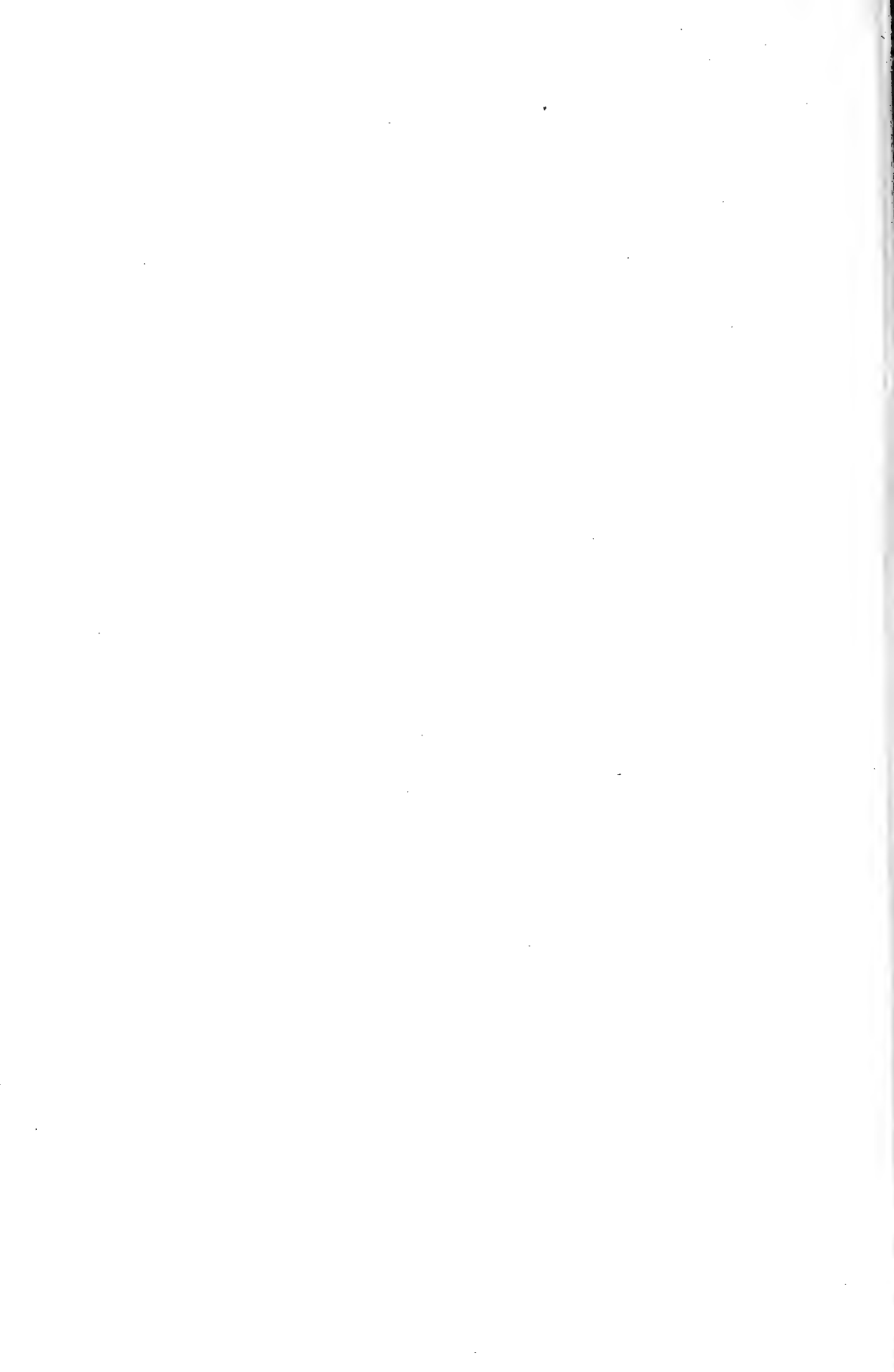
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*Listera australis* Lindl.



# The Canadian Field-Naturalist

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OTTAWA, CANADA, OCTOBER, 1940

No. 7

## *LISTERA AUSTRALIS* LINDL. IN THE PROVINCE OF QUEBEC

By HENRY MOUSLEY



UNDOUBTEDLY, the Southern Twayblade (*Listera australis* Lindl.) is one of the rarest orchids in the Province of Quebec, and in the Dominion also, for previous to my finding it this summer (1940), there was no record for the Province, and only one other for the whole Dominion of Canada, and that in the Province of Ontario. This record, however, dates back to the summer of 1893, when on June 21, the late Prof. Fletcher discovered it in the large bog, Mer Bleue, situated about fifteen miles east of Ottawa. In the National Herbarium of that city there is a sheet No. 27,259 containing one specimen of the plant collected by the late Prof. Fletcher, this being the only record in the Herbarium, and so far as I understand, it has never been re-discovered in the Mer Bleue since, although the bog has been somewhat extensively worked in recent years by at least two well known botanists, without success.

Naturally, I experienced a great thrill when first meeting with it on June 27, in a delightful little bog near Ste. Dorothée, Que., a village about twenty miles north of Montreal, and thus being able not only to add it for the first time to the flora of the Province of Quebec, but also to record the only other known station for the whole Dominion of Canada.

What this little sphagnum bog, surrounded as it is with spruce, tamarack, maple and young white pines, will eventually produce, I cannot say. At my first visit on May 22, I observed specimens of that somewhat local and never very plentiful little hairstreak butterfly, the Banded Elphin (*Incisalia niphon*), which only occurs where young pines are to be found. The sphagnum moss was carpeted with pitcher plants (*Sarracenia purpurea*) and amongst the orchids, later on, were found the Rose Pogonia (*Pogonia ophioglossoides*), Grass Pink (*Calopogon pulchellus*), and the somewhat local White Fringed Orchid (*Habenaria blephariglottis*), possibly the most

beautiful of all the fringed *Habenarias* with its pure white soft feathery blossoms. This species apart from the beauty of its flowers has an interesting underground development being gemmiparous, I use the word in its restricted sense of producing not ordinary leaf-buds resulting in a new growth on the same plant, but adventive buds on stolons which detach themselves from the parent and develop into separate plants, starting life on their own, the same as does *Habenaria clavellata* and *H. flava*. Altogether, I only located seven widely separated plants, but fortunately all of these came into flower. It is my opinion that this species with *Listera australis* are only just beginning to establish themselves in this little bog. Other plants to be found associated with *Listera australis* may be mentioned the following, viz: Lambkill (*Kalmia angustifolia*), Pale Laurel (*Kalmia polifolia*), Labrador Tea (*Ledum groenlandicum*), Cassandra or Leather Leaf (*Chamaedaphne calyculata*), Bog Rosemary (*Andromeda glaucophylla*), Small Cranberry (*Vaccinium Oxycoccus*), Round-leaved Sundew (*Drosera rotundifolia*), whilst on the surface of the small pond the lovely white Water Lily (*Castalia odorata*) may be found blooming early in July. Strange to say the only birds so far found breeding in the immediate vicinity of the bog, are the Bittern (*Botaurus lentiginosus*), Canada Warbler (*Villosia canadensis*), and White-throated Sparrow (*Zonotrichia albicollis*), but this seeming paucity may be due to the fact of a Sharp-shinned Hawk (*Accipiter velox*) having its nest in a spruce tree near the edge of the bog.

The underground development of our native orchids, as well as the extent to which they may be found diverging from type, has always appealed to me more or less strongly, and I have made it a special study of late years, especially with regard to *Spiranthes*, *Amesia* (*Serapias* L. *Epipactis* Crantz), *Habenaria*, *Corallorrhiza*, *Calypso*, *Liparis*, *Malaxis*, and *Listera*. In those species more especially possessing one or two leaves as

the type form, I have generally found the divergence to consist in the addition of an extra leaf, which in most cases is situated above the normal one or two as the case may be.

Hegi in his *Illustrierte Flora von Mitteleuropa*, vol. ii, p. 393, speaking under the heading of *M. monophylla* (L.) Sw., says, "There appear not too rarely two leaves on the stem (*M. diphyllus*, Cham.=*Microstylis diphyllus*, Lindl.) of which then the upper always is smaller. Specimens with three or still more leaves, of which the upper were bract-like, have also been observed". Strange to say I have never found in our Eastern form *Malaxis brachypoda* (Gray) Fernald, now separated from the Eurasian plant (*M. monophylos* (L.) Sw.) whose flowers are resupinate, or upside-down, so that the lips point up; while in the plant of eastern America the flowers are in normal position, with drooping lip. Asa Gray recognized this difference in 1853 when he described the American species as *Microstylis brachypoda*, any examples with the extra leaf above the normal one, but I have found two examples which are illustrated in the *Orchid Review* of December, 1927, and February, 1929, in which the extra leaf appears below the normal one, evidently of rare occurrence since only one other instance (previous to the present survey) has come under my notice, and that in *M. unifolia* which is also figured in the *Orchid Review* of December, 1927. In this latter species, however, quite a number have been found in which the extra leaf appears above and just inside the normal one. *Orchid Review* of December, 1927, and February, 1929.

In the case of *Habenaria obtusata* I have always found the extra leaf to be above the normal one without exception, but in *H. orbiculata* in the only example I have ever come across the third leaf springs from the same level as the normal pair, *Orchid Review*, April, 1934. This is also the case in *Liparis Loeselii*, *Cypripedium acaule*, and *Orchis spectabilis*.

In *Pogonia ophioglossoides* one would naturally expect to find the extra leaf above the normal central one and the bract leaf, and so I have found it, but I also possess two interesting examples in which this third leaf is borne on a separate stem springing from the base of the

plant at flowering time, as figured by W. H. Gibson in his *Our Native Orchids*, 1905, pl. XXIX.

Coming now to the *Listeras* which have been left to the last as the result of my having come across a further aberration in *L. australis*. Taking *Listera cordata* to begin with, I have three examples (but none of *australis*) in which as usual the extra leaf is above the normal pair and one in which it is in the centre of the usual pair thus forming a miniature whorl. This is also the case with two of my *australis*, beside which, the size of the leaves in the normal pairs varies considerably, in one instance as much as 60 mm. in length by 72 mm. in width, whilst in the largest and finest plant illustrated, the third leaf, a very small one, 80 x 60 mm. only, is much below the normal pair, which pair, instead of the two leaves being opposite to one another as is usual, are separated by a space of 2 cm., surely a very unusual occurrence? In addition, this plant exceeds the greatest height of nine inches recorded by Morris and Eames in their delightful book *Our Wild Orchids*, 1929, by one and one half inches. I certainly agree with these authors that *L. australis* takes a lot of beating, its sharp pointed upcurled shining dark green leaves, with purplish stem and spike of flowers, and general sturdy appearance, far surpasses that of *cordata* or *convallarioides*, the only other two *Listeras* that I am familiar with. Looking back for a moment to these so-called departures from type i.e., the type form as we know it today, may they not point the reading on the wall, and suggest that in the remote past these plants were not always as we see them today, gradual evolution having brought this about. In the dim past possibly the stem consisted of many nodes, and these extra leaves of today may be an attempt (in specially robust plants) to revert to a state of things that existed ages ago, when the stem bore several leaves one above the other. Can it be possible this supposition of today may not be the true solution to the problem—I wonder?

In conclusion, I have presented specimens of *Listera australis* to the National Herbarium at Ottawa, the Herbarium of the Botanical Institute of the University of Montreal, the Herbarium of Prof. Oakes Ames, and the Gray Herbarium, whilst my best thanks go out to the kind friend who first introduced me to this little *El Dorado*.

## NOTES ON THE HABITS OF THE PIGMY SHREW (*Microsorex hoyi*) IN CAPTIVITY

By **LESLIE A. PRINCE**



WHILE ENGAGED in field work for the Royal Ontario Museum of Zoology at Lake Attawapiskat, Patricia portion of Kenora district, Ontario, in the summer of 1939, the writer was able to make some observations on the behaviour of a captive Pigmy Shrew (*Microsorex hoyi*). At 6.30 a.m. August 10, a Pigmy Shrew was removed alive from a water trap which had been set in a dry, high grass clearing, bordering second growth alder-poplar-birch woods.

The specimen was kept alive for ten days, August 10, to August 19, in a wooden cage with a screen top. The cage was 12 inches long, 4¼ inches wide and 4½ inches deep. Moist soil, dead leaves, twigs and cotton batting were placed in the bottom.

When first observed in the water trap, the shrew was swimming rather feebly and when removed made no attempt to escape. It appeared to be very exhausted and shivered violently. Wrapping the animal in cotton batting I held it in my hand for about fifteen minutes and gradually the shivering ceased. The shrew began to struggle and bite my fingers quite viciously in an attempt to escape. The bites felt like little pin pricks but did not break the skin.

Upon removal to the cage the shrew immediately commenced to make a nest in the centre of the ball of cotton with openings at either end. On every occasion when the cage was cleaned and fresh cotton supplied the nest-making was repeated.

The shrew was continually active, its movements rapid, with many sudden stops and starts. While running the tail was held straight out from the body with a slight upward curve. It was quite adept at climbing up the sides of the cage

and walking upside down on the wire mesh top. On several occasions it hung down from the cover "monkey fashion", the hind limbs clinging to the mesh, while the front limbs and body dangled below. The shrew was a very capable jumper; and once when the top was removed, it bounded from the bottom of the cage, over the rim onto the table, a height of 4½ inches.

A violent quiver and a quick dash to cover was the reaction of the shrew to any noise or disturbance. The quivering of the body was interesting to observe. For example, if the sides of the cage were struck, the shrew would give a shudder as if it had been struck at precisely the same moment.

The snout of the shrew was constantly moving and sniffing, suggesting that it depended greatly upon its sense of smell to determine its direction.

The Pigmy Shrew did not appear to have any set period for sleeping. Observations made on a number of occasions during the night, revealed it to be just as active as during the day. During the ten days of captivity it was observed sleeping on only one occasion, in mid-afternoon. The shrew slept with the limbs drawn under the body and the head and tail curled alongside, much in the same manner as a dog would sleep.

Very audible short, sharp squeaks were emitted by the shrew as it moved about the cage. The sounds were most obvious when it was frightened or disturbed.

Food contents must have passed through the shrew's body with remarkable rapidity as the cage was continually covered with fresh droppings. While defecating, the forelegs were set low, the hind limbs braced and the tail and posterior portions of the body held high. Faeces were deposited all over the cage and in no chosen spot, the faecal pellets being small, round and moist and giving off a very strong, sickening odour.

The shrew possessed an enormous appetite and attacked each article of food with characteristic viciousness. It was purposely subjected to a diet of great variety. Freshly-trapped Cinereous Shrews (*Sorex cinereus*), one White-footed Mouse (*Peromyscus maniculatus*), the liver of a Meadow Mouse (*Microtus pennsylvanicus*), one Red-backed Mouse (*Clethrionomys gapperi*), and the carcass of a Pigmy Shrew (*Microsorex hoyi*); live grasshoppers, house flies, crane flies, one beetle and sweet buttered biscuit were included in the shrew's diet.

When the Cinereous Shrews, the White-footed Mouse and the Red-backed Mouse were placed in the cage, they were carefully sniffed all over by the Pigmy Shrew, before it commenced to break in the skull and devour the brains or tear open the stomach regions and eat the viscera. Following this operation the flesh was stripped

from the body, and a good portion of the ribs was consumed. The parts remaining usually consisted of the skin, tail and feet and most of the skeleton.

When live grasshoppers with the jumping legs removed were placed in the cage, the shrew dispatched them by biting and tearing at the head and abdominal regions. In the struggle the grasshoppers were pulled and rolled all over the cage. Only the internal organs of the grasshoppers were consumed, the exoskeleton remained uneaten. House flies, crane flies and the beetle were pounced upon and devoured by the shrew as soon as they were put into the cage.

On several occasions a watch glass of water was put into the cage. The shrew did go to the water and stick its snout in but no attempt to actually drink the water could be discerned. Fresh

Table of food contents partially consumed by *Microsorex hoyi*.

DATE	MATERIAL	WEIGHT IN GMS.	TIME
August 10 .....	1 Cinereous Shrew .....	3.4 .....	11.30 a.m.
	1 Cinereous Shrew .....	3.7 .....	1.00 p.m.
	1 House fly .....		
	1 Cinereous Shrew .....	3.9 .....	9.30 p.m.
August 11 .....	1 Cinereous Shrew .....	3.7 .....	7.30 a.m.
	1 Cinereous Shrew .....	3.3 .....	1.00 p.m.
	3 Grasshoppers .....		
	2 House flies .....		
	1 Cinereous Shrew .....	4 .....	7.00 p.m.
August 12 .....	1 Cinereous Shrew .....	4.2 .....	12.15 a.m.
	1 Cinereous Shrew .....	3.4 .....	8.30 a.m.
	7 House flies .....		3.00 p.m.
	1 Cinereous Shrew .....	4 .....	3.30 p.m.
	1 Beetle .....		
	1 Grasshopper .....		
	2 House flies .....		
	Liver of Meadow Mouse .....		5.00 p.m.
	1 Cinereous Shrew .....	3.7 .....	9.30p.m.
August 13 .....	1 White-footed Mouse .....	16.3 .....	8.30 a.m.
	4 Grasshoppers .....		
	3 House flies .....		
	Carcass of Pigmy Shrew .....	2.3 .....	2.30 p.m.

August 14 .....	1 Cinereous Shrew .....	4.2 .....	12.30 a.m.
	3 House flies .....		
	3 Grasshoppers .....		
	1 Cinereous Shrew .....	4.1 .....	2.30 p.m.
	1 Cinereous Shrew .....	3.9 .....	9.30 p.m.

shoots of green grass were placed in the cage but were never eaten.

One day the shrew was feeding on a Cinereous Shrew when three live grasshoppers were dropped into the cage. The Pigmy immediately left the Cinereous and proceeded to kill the grasshoppers one after the other. While feeding upon these four specimens a piece of sweet buttered biscuit was dropped into the cage. The Pigmy immediately ran over, ate the biscuit voraciously and returned to feed on the grasshoppers and Cinereous Shrew. It was observed that the shrew

took the piece of biscuit between its forefeet and lifted it to its mouth, sitting back on its hind legs and feeding much in the manner of a squirrel.

On August 15th the *Peromyscus* placed in the cage on August 13th, was removed. The skull had been broken, the flesh stripped off the skull and the brain completely devoured. The portions remaining, were the tail, limbs, feet and parts of the vertebrae and ribs. The remaining portions weighed 5.2 gms. The original weight before attacked by the Pigmy Shrew was 16.3 gms.

August 15 .....	2 House flies .....		
	2 Grasshoppers .....		
	1 Cinereous Shrew .....	3.7 .....	5.00 p.m.
August 16 .....	1 Cinereous Shrew .....	3.6 .....	12.15 a.m.
	1 Red-backed Mouse .....	12.3 .....	9.00 a.m.
	1 Cinereous Shrew .....	3.9 .....	10.00 a.m.
	2 House flies .....		
	2 Grasshoppers .....		
August 17 .....	1 Cinereous Shrew .....	4.2 .....	10.00 a.m.
	1 Crane fly .....		
	2 Grasshoppers .....		
	2 House flies .....		
	1 Cinereous Shrew .....	3.4 .....	5.00 p.m.

The Red-backed Mouse which was placed in the cage on August 16th was removed on August 18th at 9.00 a.m. The remaining portions weighed 5.3 gms.

August 18 .....	1 Cinereous Shrew .....	4.1 .....	9.30 a.m.
	1 Cinereous Shrew .....	4.2 .....	5.00 p.m.
	2 Grasshoppers .....		
	2 House flies .....		
	1 Crane fly .....		

During the ten days the shrew was kept in captivity, 20 Cinereous Shrews, 1 White-footed Mouse, 1 Red-backed Mouse and the carcass of a Pigmy Shrew were placed in the cage. The total weight of this material was 107.5 gms. In addition 20 house flies, 22 grasshoppers, 2 Crane flies, 1 beetle and the liver of a Meadow Mouse were consumed by the Pigmy Shrew.

When examined at 7.45 a.m. on August 19, the shrew was lying in a corner of the cage, was unable to move and appeared to be in a very

weakened condition. The last examination had been made at 9.30 p.m. the previous evening. On this occasion the shrew was very active and seemed quite normal. The shrew was removed from the cage and after a few seconds of trembling and gasping it died.

The Pigmy Shrew proved to be an immature female and weighed 3.4 gms. immediately after death. The measurements of this specimen are: total length, 89 mm.; tail vertebrae, 35 mm.; hind foot, 11.5 mm.

## NOTES ON THE CYPERACEAE OF SASKATCHEWAN

### I. SCIRPUS

By W. P. FRASER



RECENT collections of the flowering plants of Saskatchewan have added much to the knowledge of their occurrence and distribution in this province. These collections were made chiefly in the southern half of the province. They did not extend much further north than the southern end of Montreal and Turtle Lakes, about 54° N. Lat. Notes on some of these may be of interest as a number of species have been found not previously reported from Saskatchewan. All the species collected are represented in the herbarium of the University of Saskatchewan. Considerable attention was given to the collection of the *Cyperaceae* and the genus *Scirpus* is treated in this article as the species collected probably are fairly complete for the area investigated. Acknowledgement is made of a report on duplicates of the collections by Alan A. Beetle of the University of California.

*Scirpus americanus* Pers. THREE-SQUARE BULRUSH.—This species is common in wet places and marshes around sloughs and lakes. (*Scirpus pungens* Vahl. of Macoun's Cat.)

*Scirpus caespitosus* L. var. *callosus* (Bigelow) Fern. TUFTED CLUB-RUSH.—Fernald (*Rhodora* 23, 22, 1921) points out that the common northern species which has passed as *Scirpus caespitosus* L. is distinct and refers it to the variety *callosus* Bogs. McKague (collected by A. J. Breitung), Prince Albert.

*Scirpus cyperinus* (L.) Kunth. (*Eriophorum cyperinum* L.) WOOL-GRASS.—Occasional in wet places in the northern part of the area investigated. Meadow Lake, in the Prince Albert National Park north and south of Waskesiu, and near the Indian Reserve. Macoun (*Cat. of Can. Plts.*) does not report collections from Saskatchewan, but quotes from Hooker's Flora, "Canada to the Saskatchewan".

*Scirpus fluviatilis* (Torr.) A. Gray. RIVER BULRUSH.—Collected only along the marshy shore of Pike Lake about 20 miles south of Saskatoon. This seems to be a northern extension of the western range of this species. No previous record of its occurrence in western Canada was found.

*Scirpus hudsonianus* (Michx.) Fern. (*Leucocoma alpina* (L.) Rydb., *Eriophorum alpinum* L.) ALPINE COTTON-GRASS.—Collected only at McKague by A. J. Breitung.

*Scirpus microcarpus* Presl. SMALL-FRUITED BULRUSH.—Widely distributed in wet places throughout our area but not common.

*Scirpus nevadensis* S. Wats. NEVADA BULRUSH.—Marshes at Vonda and Redberry Lakes (collected by R. C. Russell). Abundant in a large drying slough near Saskatoon. Reported from Old Wives Lakes (Johnson Lake) by Macoun.



This species does not seem to be common or often collected. It may have been overlooked because of its resemblance to *S. paludosus* A. Nels.

*Scirpus paludosus* A. Nels. PRAIRIE BULRUSH.—Very common in marshes around sloughs and lakes in the prairie region.

*Scirpus pauciflorus* Lightf. FEW-FLOWERED CLUB-RUSH.—Svenson (*Rhodora* 31, 173, 1929) in his monograph of the genus *Eleocharis* assigns this species, which is usually placed in *Scirpus*, to the section *Pauciflorae* of the genus *Eleocharis*. In this section the tubercle is confluent with the apex of the achene. He states, "A thorough examination of the species of *Scirpus* which might be considered close to this species has convinced me that *Eleocharis pauciflora* and its allies stand clearly apart from *Scirpus*." Following Svenson our collections are assigned to *Eleocharis pauciflora* (Lightf.) Link.

McKague (collected by A. J. Breitung), bog near Saskatoon associated with *Scirpus pumilus* Vahl.

*Scirpus pumilus* Vahl. *Scirpus alpinus* Schleich.) ALPINE CLUB-RUSH.—Victorin (*Trans. Roy. Soc. Can.* 3rd. Ser., xxiii, pt. 2, Sect. v, 1928) reports in detail collections of this species in the Mingan Islands and Anticosti.

Fernald (*Rhodora* 3, 123, 1931) reports collections from the Canadian Rocky Mountains from

Banff and Laggan, Alberta. No other collections seem to have been reported from Canada.

Collections were made in 1938 and 1939 in a small, depressed, alkaline bog at Sutherland, about two miles from Saskatoon. This species was abundant in a small area of the bog closely associated with *Eleocharis pauciflora* (Lightf.) Link, *Lobelia Kalmii* L. and *Scirpus rufus* (Huds.) Schrad. and other bog species. Collections of plants in flower were obtained in June and specimens fruiting freely later in the season. No other plants of this species were observed elsewhere though much collecting was done in the bogs of the northern part of the area surveyed.

*Scirpus rufus* (Huds.) Schrad. RED CLUB-RUSH.—Collected only in the alkaline bog at Sutherland near Saskatoon where *S. pumilus* was collected. It seems to be a rare species as it was not collected elsewhere. It is not reported in Macoun's catalogue. Probably a westward extension of its range.

*Scirpus validus* Vahl. (*S. lacustris* Am. authors). COMMON BULRUSH.—Common in wet places and in water throughout the area.

*Scirpus atrovirens* Muhl. DARK-GREEN BULRUSH.—This species was not collected. Saskatchewan is included in its range by Rydberg's manuals. No collections are reported by Macoun but he includes Saskatchewan based on Hooker's Flora.

## REVIEWS

ANNUAL REPORT OF THE PROVANCHER SOCIETY OF NATURAL HISTORY OF CANADA.—Quebec, 1940, pp. 1-116.

The Provancher Society continues to serve the interests of conservation and natural history in the Province of Quebec in a very active manner. It maintains an excellent bird sanctuary at Ile-aux-Basques and Razades Islands near Trois-Pistoles, and sponsors educational work, particularly among school children. It should be noted that the public is invited to visit the sanctuary between the 15th of July and the 1st of September each year, when the Guardian acts as guide.

During the year the Society suffered a great loss in the death of its devoted secretary, Mr.

Louis B. Lavoie, whose passing was recorded in *The Canadian Field-Naturalist* for January of this year. The obituary published in *The Canadian Field-Naturalist* is published by the Society in a translation by Dr. Gustave Ratté.

The report contains two scientific articles, namely, "Bird Banding Activities", by Dr. D. A. Dery, and 'Mammifères de la Province de Québec' by Dr. R. M. Anderson (pp. 37-111). The latter, while in the main a translation of the paper of the same name published in English in last year's report, contains some additional material, particularly a description of *Clethrionomys gapperi hudsonius* subsp. nov.

Dr. Anderson's paper is preceded by a biographical sketch written by Dr. Ratté.—C.H.D.C.

# NOTES ON THE ONTARIO SPECIES OF SCUDDERIA (*Orthoptera, Ensifera*)

By F. A. URQUHART<sup>1</sup>



THE SPECIES of *Scudderia* are commonly called "katydids", "narrow-winged katydids", or "bush-katydids". However, the name "katydid" properly belongs to a more southern species, *Pterophylla camellifolia*, the rasping and somewhat guttural sound produced by this species closely resembling a monotonous repetition of the word "katydid".

The so-called "bush-katydids" are abundant in marshes and fields during August and September throughout the greater part of Southern Ontario. The sound produced by the males is very characteristic consisting of a series of distinct rasping notes, "z-z-z-ip z-z-z-ip . . . ." terminated by a few sharp clicking sounds, the same theme being repeated incessantly from sunset to sunrise.

The five species of *Scudderia* known to occur in Ontario may be readily identified from the following key and accompanying figures:

## KEY TO THE ONTARIO SPECIES OF SCUDDERIA

1. Ultimate tergite of the male not produced into an elongate median process. Arboreal . . . . . *S. septentrionalis*  
 Ultimate tergite of the male produced so as to form an elongate median process . . . . . 2
2. With a median process between the two lobes of the furcate apex of the male ultimate tergite (fig. 5). Of large size; tegmina long and narrow; inhabiting marshes; ovipositor of the female as in fig. 6 . . . . . *S. texensis*  
 Without a median process between the two lobes of the furcate apex of the male ultimate tergite. Of medium size; tegmina narrow or broad; usually inhabiting shrubs and long grass . . . . . 3
3. Apex of the male ultimate tergite swollen, the two lobes somewhat oval and widely separated (fig. 7). Tegmina narrow; ovipositor of the female as in fig. 8 . . . . . *S. furcata furcata*  
 Apex of the male ultimate tergite not swollen, the two lobes smaller and somewhat depressed. Tegmina broader . . . . . 4
4. Lobes of the apex of the male ultimate tergite tapering (fig. 9). Tegmina broad; ovipositor of the female as in fig. 10 . . . . . *S. pistillata*

Lobes of the apex of the male ultimate tergite decidedly depressed and with distinct marginal flanges (fig. 11). Tegmina narrow; ovipositor of the female as in fig. 12 . . . . .

. . . . . *S. curvicauda curvicauda*

*Scudderia septentrionalis* (Serville). NORTHERN BUSH-KATYDID.—This species is included in the present paper based upon a single male specimen that was apparently taken at Guelph, Ontario and contained in a "student collection". This species probably does occur in the more southern parts of Southern Ontario but, possibly owing to its arboreal habits, it has so far escaped detection.

*Scudderia texensis* Saussure-Pictet. TEXAN BUSH-KATYDID.—The "texan bush-katydid" is of common occurrence in marsh areas in extreme Southern Ontario. It has not been taken along the north shore of Lake Ontario from Hamilton to Brockville, but it is of common occurrence in marshes from Brockville to Lancaster in eastern Ontario (fig. 1).

This species has been previously recorded by Walker (1904) from Point Pelee, Arner, Sarnia and Walpole Island. Specimens have also been taken at Kingsville, Port Rowan, MacGregor, Essex, Tecumseh, Amherstburg, La Salle, Malden Centre, Niagara Falls, Colchester, Oxley, Trenton (C.N.C.), Guelph (O.A.C.), Lancaster, and Brockville.

*Scudderia furcata furcata* Brunner. FORK-TAILED BUSH-KATYDID.—The "fork-tailed bush-katydid" has been previously recorded by Walker (1904) from Point Pelee, Arner, Rondeau, Sarnia, Toronto, Lake Simcoe, Severn River, Dwight, and North Bay. Specimens have also been taken at Kingsville, Go Home Bay, Chatham, Trenton (C.N.C.), Ottawa (C.N.C.), Blackburn (C.N.C.), Ingersoll (C.N.C.), Constance Bay (C.N.C.), Bell's Corners (C.N.C.), Guelph (O.A.C.), Port Stanley (O.A.C.), Brockville, and Bolton

The probable distribution of this species in Ontario is shown in fig. 2.

*Scudderia pistillata* Brunner. BROAD-WINGED BUSH-KATYDID.—The "broad-winged bush-katydid" has been previously reported from Toronto, Lake Simcoe, Southampton, Burke's Island, Dwight, and Algonquin Park by Walker (1904); and from Fort William and Temagami by the same author (1909). Specimens have also been taken at Grand Bay

<sup>1</sup> Royal Ontario Museum of Zoology.



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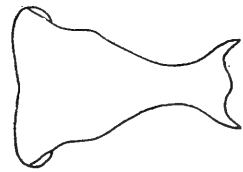
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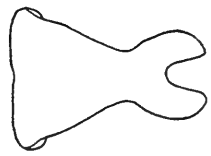
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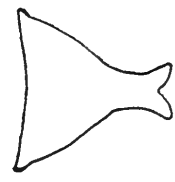
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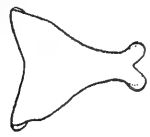
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(Lake Nipigon), Macdiarmid, East River (Nipissing District), Sesikinika, Rosegrove, Parry Sound, Lake of Bays (C.N.C.), Hawthorn (C.N.C.), Sudbury (C.N.C.), Ottawa (C.N.C.), Constance Bay (C.N.C.), Trenton (O.A.C.), Guelph (O.A.C.), Leg Lake (O.A.C.), Brockville, Manitoulin Island, and Lancaster.

The probable distribution of this species in Ontario is shown in fig. 3.

*Scudderia curvicauda curvicauda* (DeGeer). CURVE-TAILED BUSH-KATYDID.—This species has been previously reported from Arner, Toronto, Tobermory, and Severn River by Walker (1904). Specimens have also been taken at Kingsville, Macdiarmid, Go Home Bay, Inglewood, Algonquin Park, Tobermory, Constance Bay, Aylmer (C.N.C.), Manitoulin Island, Hawthorn (Mer Bleue) (C.N.C.), and Brockville.

The probable distribution of this species in Ontario is shown in fig. 4.

(C.N.C.): Canadian National Collection, Ottawa.

(O.A.C.): Ontario Agricultural College Collection, Guelph.

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#### EXPLANATION OF FIGURES

Figure 1. Distribution of *Scudderia texensis* in Ontario.

Figure 2. Distribution of *Scudderia furcata furcata* in Ontario.

Figure 3. Distribution of *Scudderia pistillata* in Ontario.

Figure 4. Distribution of *Scudderia curvicauda curvicauda* in Ontario.

Figure 5. Ultimate tergite of male *Scudderia texensis*.

Figure 6. Ovipositor of *Scudderia texensis*.

Figure 7. Ultimate tergite of male *Scudderia furcata furcata*.

Figure 8. Ovipositor of *Scudderia furcata furcata*.

Figure 9. Ultimate tergite of male *Scudderia pistillata*.

Figure 10. Ovipositor of *Scudderia pistillata*.

Figure 11. Ultimate tergite of male *Scudderia curvicauda curvicauda*.

Figure 12. Ovipositor of *Scudderia curvicauda curvicauda*.

## DUCK MORTALITY IN THE CATARAQUI MARSHES

By G. C. TONER



FOR several years past the local fish and game protective association has received reports that wild ducks of various species were dying in the marshes of the Cataraqui river, above Kingston, Ontario. This mortality was supposed to occur each spring while the birds were concentrated in the area before passing northward on their migrations. In 1940 it was decided to investigate the reports and under the direction of Dr. G. B. Reed, Queen's University, a number of birds were examined in the Bacteriological Laboratories. The writer particularly wishes to thank Dr. Reed for his kind cooperation. Thanks are also due to D. E. Plotz for providing a motor boat for the field trips and to R. W. Smith for aid in field identification.

On April 3, 1940, the edge of the open channel was carefully examined for sick birds. Many hundreds of ducks were concentrated along the open water, having arrived about April 1st. Part of this channel is ice free throughout the year but it is not until open water extends a mile or two in length that the great flocks of ducks arrive. The species noted on this date were Greater and Lesser Scaup, Common Golden-eyes, Black Ducks, Common Mergansers and a lone Bufflehead. No sick ducks were noted but a Greater Scaup drake and a Lesser Scaup female were collected.

On April 11th the great flocks were still present but only one dead duck, a Common Golden-eye, too decayed to examine, was found. On April 23rd,

many of the birds were gone but three sick ducks were taken. On April 26th another sick bird was caught and as most of the flocks had departed—only about twenty birds were seen—the work was discontinued for the year.

Laboratory examination of the specimens was carried out within twenty-four hours of the time they were collected.

1. Lesser Scaup female, obviously not sick, shot, normal as far as could be ascertained.
2. Greater Scaup drake, shot, normal.
3. Greater Scaup drake, living, but unable to fly when collected. Digestive tract was filled with green plants. Lining of the gizzard was yellowish-green with several necrotic areas, 10 sq. cm., or more in size, from which the roughened, bark-like lining could be readily slipped away from the underlying muscles. No lead could be found by gross examination.
4. Greater Scaup drake, poor condition, unable to fly or to stand. Digestive tract was packed with green plants. Lining of the gizzard, yellowish-green without necrotic areas. Nine lead shot were present.
5. Greater Scaup female, poor condition, limbs paralysed, mass of green plants in the digestive tract with slight necrotic patches on lining of gizzard. Four lead shot were present.
6. Greater Scaup drake, thin to emaciation, paralysed, gizzard showed a yellowish-green lining but no necrotic patches. Seven lead shot were found, all badly eroded.

Pirmie (1935), Green (1939) and others have shown that lead poisoning in ducks is the cause of considerable mortality in the wild flocks. The birds pick up the shot with the gravel, so necessary for grinding the food. The finely divided metal, worn away by the mechanical action of the gizzard, is absorbed through the intestines, causing paralysis of the muscles. Several weeks may elapse after ingestion of the lead before its effects are apparent. Torrey *et al* (1934) produced lead poisoning experimentally in ducks by feeding lead in the form of shot. One specimen, fed eight No. 6 shot, died in 42 days, showing, on autopsy, necrotic areas in the lining of the bulbo-ventriculus, this lining having a yellowish-green colour. These experimenters found similar changes in ducks picked up in the field.

It has been pointed out, *Anon.* (1939), that lead shot in the gizzard is not evidence that lead is being absorbed. From the present work, and from the accounts of others, Shillinger and Cottam ((1937), Torrey *et al* (1934), it is appar-

ent that paralysis of the wings and legs is, to some extent, symptomatic of the disease. However, there are other pathological conditions that may likewise cause paralysis so autopsies should be done when the disease is suspected.

From the foregoing review it seems apparent that the changes in the gizzards of the four birds examined are the result of lead poisoning. The necrotic areas and the change in colour to yellow-green of the gizzard lining appear to be characteristic. The masses of food in the digestive tract and the finding of lead shot are supporting evidence. The anonymous writer, *ibid*, states that blackening of the lining of the caeca is an indication that lead is being absorbed though this change was not observed in the present lot of birds.

Four sick birds were picked up on the Cata-raqui marshes and examined for evidence of lead poisoning. One of these showed marked necrotic changes in the gizzard, generally associated with the disease but no shot were found. Three had lead shot in the gizzard, one also showed the yellowing necrotic change, one showed the yellowing only and one had a normal gizzard.

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## FURTHER NOTES ON THE SAND CRICKET, *TRIDACTYLUS APICALIS* SAY

By F. A. URQUHART<sup>1</sup>



IN A PREVIOUS publication (1937)<sup>1</sup> the writer described the egg-laying habits of the sand cricket and stated that there "were from 10 to 27 eggs in each batch

However, further collecting has shown that the number of eggs in each batch varies from 8 to 18; the number 27 being due to an error in copying from the original field notes.

On June 16, 1940, adults, nymphs and eggs of *T. apicalis* were taken in the same locality (Don Creek, Sunnybrook Park, Toronto). From these two records, namely August 2, and June 16, it may be inferred that the sand cricket oviposits during early and mid-summer; this may explain the presence of adults and nymphs of various instars throughout the summer and also during hibernation in winter (Urquhart, 1937)<sup>1</sup>. There was an obvious difference in the location of the brood chambers in June as compared with those found in August; in August the brood chambers were located in the mud flats within one or two feet of the water's edge, whereas during June the brood chambers were located in sandy banks some ten feet from the water's edge. The sand in which the eggs were found was exceedingly moist in both cases. The burrows, leading to the brood chambers, located in the mud flats in August extended horizontally within an inch or so of the surface of the soil, while the burrows located in the sandy banks in June extended in a vertical direction to a depth of three or four inches. This difference in the location and position of the burrows found in early and mid-summer may be correlated with the difference in the water level of the neighbouring creek: During the early summer, the higher water level causes the mud flats to become saturated with water thus inhibiting the formation of brood chambers; and sand crickets are thus

compelled to inhabit more distant locations on the adjacent sand banks and to extend their burrows in a vertical direction in order to reach sand of the required moisture content.

The writer has repeatedly observed that the sand cricket occurred in open, moist sand areas where there was little or no apparent vegetation. Specimens were rarely taken in grassy areas, except for the odd specimen that had been flushed from an open sand area. It was more or less assumed that the sand cricket fed upon the roots of plants, and, possibly, the aerial parts of grasses. That it was more abundant in areas devoid of living vegetation seemed to discredit this contention. An examination of the contents of the alimentary tract of twenty-eight specimens disclosed quantities of minute particles of sand with no traces of plant tissue. This would suggest that the sand cricket obtained its food in a worm-like fashion by swallowing silt containing decaying vegetable matter and, possibly, algae.

In my previous paper (1937)<sup>1</sup> I stated that "the only other species of North American Tridactylidae is *Tridactylus minutus* Scudd." "*minuta*" being an error in printing—"which is not known from Ontario." However, since this publication, *T. minutus* has been taken by Dr. E. M. Walker at Morpeth, Ont., (1940)<sup>2</sup> and by the writer at Port Rowan in Norfolk County. In the latter locality, *T. minutus* was found inhabiting the mud flats at the margin of a small pond in company with *T. apicalis*.

1. Urquhart, F. A.—Some notes on the sand cricket, (*Tridactylus apicalis* Say). Can. Field-Nat., LI; 28-29.
2. Walker, E. M. and Urquhart, F. A.—New records and notes of Orthoptera in Ontario. Can. Ent., LXXII; 15-19.

<sup>1</sup> Royal Ontario Museum of Zoology.

## CHIEF FACTOR JAMES ANDERSON'S BACK RIVER JOURNAL OF 1855

(Continued from page 89)

Wed. 4. Began to load at 3 a.m. Our nets produced nothing. We made 8 portages today, most of them short and about 35 miles of lake route. The lakes are getting larger and the height of the mountains is diminished. Wood is fast disappearing. The whole country is clothed in Reindeer Moss,<sup>95</sup> and is evidently much frequented by those animals. It is now utterly lifeless with the exception of a very few birds such as robins, loons and eagles.<sup>96</sup> The water in the lakes is of crystal purity; they are said to abound in fine trout and W. Fish; we, however, have caught none. We passed through a lake about 7 miles in length, which empties itself into Slave Lake by a very rapid river (unnavigable). A little to the N.E. of the mountain, at the head of this lake we found banks of snow still 10 ft. thick. A little before encamping we passed through a large body of water, broad and 10 miles in length. Another lake empties itself into it by a fine fall of (July, 1855, *Slave Lake to Lake Aylmer*—22—). (Spent up to this date 3 bags Pem'n., 2 bags flour. Opened one of each at mid-day today, 4th). about 50 feet in height; it passes through a door like cut in the rocks.<sup>97</sup> We encamped a little beyond this at 7¾ p.m. Set the nets. Weather is very warm and mosquitoes and sand flies dreadful; a slight breeze today gave us some relief. I shall for the sake of reference name all the lakes we pass through, but not those I see from high mountains; they are innumerable, of all sizes and at every elevation. Saw

some old Indian encampments (last year's of 11 Lodges). Lat. of the portage where snow was seen by a M. ob. of Mr. Stewart's, 64° 4' 52". The general direction of our route is (compass) a little to the W. of North.<sup>98</sup>

Thurs. 5th. Began to load at 3 a.m. We are very unlucky; the nets set last night produced nothing. We made 6 portages—two of them about ½ mile each in length, the others short—and about 47 miles through lakes; two of these were 12 and 13 miles in length,<sup>99</sup> two of 5 and 7, 2 others very small. We are now encamped about half way in a large lake full of islands; we saw divers and gulls in it as well as white partridges in their brown garb, and traces of marmots<sup>100</sup> are also seen at our present encampment. A fine salmon trout and a pike<sup>101</sup> were taken; the one with a line, the other shot. The appearance of the country is less savage. The mountains (Granites) now rise (July, 1855, *Slave Lake to Lake Aylmer*—23—) gradually and rarely exceed 100 to 200 feet in height; their rounded summits are covered with moss and debris of rock—the same process of disintegration is going on with the next layer. Some gravelly islands and sand-hills were seen. Wood is getting rare indeed; we cooked breakfast with a kind of heath today; it burns well.<sup>102</sup> The weather is excessively warm, but an aft wind tempered the heat and helped us on our way; it also kept down the mosquitoes and sand-flies a little—in the evening however they were in clouds. Set the net again. Encamped at 9½ p.m., men rather tired. The canoes are very heavy, particularly mine, it takes 6 men to carry her. Our route today was crooked but the general direction is N.N. Wt. Compass.

95. Since it is said that the "wood is fast disappearing" the "reindeer moss" here mentioned is probably *Cladonia rangiferina* or *Cetraria nivalis* (A.E.P.).

96. Robins, *Turdus migratorius*, loons probably Red-throated Loon, *Gavia stellata* and Yellow-billed Loon, *Gavia adamsi*; eagles, possibly various species already mentioned with the addition of the Common Rough-legged hawk, *Buteo lagopus* (P.A.T.).

97. This is marked on the sketch map page 88 as Rae Falls. It is curious that in this Journal the falls are not named, yet in a copy of Anderson's Journal forwarded to the writer from Hudson's Bay House, London, England, the following quotation for July 4th is made: "Another lake empties itself into it by a fine fall about 50 feet in height, through a door-like cut in the rocks. I have called this Rae Falls." Mr. John Carroll, D.L.S., in 1938 obtained a ground picture of these falls, which bears out the above description (M.G.C.).

98. This should be about 63°10', and his direction is astronomically east of north, as the magnetic declination here is almost N.40°E. (M.G.C.).

99. It is interesting to note that Warburton Pike and McKinley on June 11th 1890, as noted in McKinley's journal "camped below a bank of fine sand of a red colour on the edge of a lake which is the track by which Anderson and Stewart canoed it to the Great Fish river". This is thought to be David lake, where an esker cuts across the West end. See sketch map (M.G.C.).

100. Parry's Ground Squirrel, *Citellus parryi*. (R.M.A.).

101. Salmon trout, *Cristivomer namaycush*; pike, *Esox lucius* (J.R.D.).

102. Obviously the white heather, *Cassiope tetragona*. (A.E.P.).

(The water from this lake runs towards Lake Aylmer.)

(July, 1855, *Slave Lake to Lake Aylmer*—24—)

Friday 6th. Began to load at 5½ a.m. having given the men a little extra sleep. The Indian took us into a Bay yesterday evening and we lost ¼ hour in getting to the proper road. The remainder of the lake was free from islands; in some parts we had a clear horizon; it is a splendid body of water.<sup>103</sup> Some rocks were still covered with ice and patches of snow were seen, throughout the day; it is evident that the ice has only lately broken up. This lake is 23 miles in length and perhaps 8. or 10 in breadth in most parts. We ran the canoes down two short pieces of river, but the pieces were carried as they were both shallow. This brought us to the largest lake we have yet met with.<sup>104</sup> We encamped on it after making about 30 miles. The mountains are now gently sloping hills—some sandhills were seen in both lakes. Wood is very scarce; a patch of moderate sized spruce was however, seen in this lake, but with this exception it is about 2 ft. or 3 ft. in height; the trunks are shaped like carrots at this encampment the trees are like walking sticks (the largest) and about 1½ feet in height. We shall leave even this tomorrow. A marmot<sup>105</sup> was seen and six white grouse with 2 Canada geese<sup>106</sup> (moulting) killed. We (July, 1855, *Slave Lake to Lake Aylmer*—25—) were alarmed a little before encamping by seeing our road apparently barred by ice; fortunately we found a passage round it; it was a broad belt traversing the lake. One of our best men is sick; he has injured his testicle in some of the portages. Weather extremely warm. Flies as usual. Encamped at 8½ p.m.

Sat. 7th. Left at the usual hour, made 3 portages; they together measured 5¼ miles of bad road; and 17 miles of lake way. This brought us to a small lake communicating with the river falling into Lake Aylmer.<sup>107</sup> Encamped at 8 p.m.; men tired. At the last portage but one we saw a clump of small spruce about 16 inches in height. A few grouse<sup>108</sup> were shot. Nets set. These lakes abound in fine salmon trout.<sup>109</sup>

103. Margaret Lake, see map. (M.G.C.)

104. Back Lake, see map. (M.G.C.)

105. *Citellus parryi*. (R.M.A.)

106. Ptarmigan *Lagopus* sp. (P.A.T.).

107. Montours Lake, see map. (M.G.C.)

108. Ptarmigan, *Lagopus* sp. (P.A.T.)

109. *Cristivomer namaycush* (J.R.D.)

Sund. 8th. Left our encampment 5½ a.m. The canoes are well arranged. Took up Aylmer the net which yielded only 2 trout. Lake Got into the river at 6 a.m. and reached the mouth at 7½ a.m. Ran 2 good rapids. Except at the mouth of the river we found L. Aylmer fast, along shore however, and the bays afforded a passage. After paddling about (July, 1855, *Lake Aylmer*—26—) 30 miles we found our passage barred. Broke a piece along shore, but at last the ice began to drive on shore in large fields and we were compelled to encamp at a short distance (a mile or two) from the portage of Sussex Lake. This is most provoking—the whole of the Lake to the North and Eastward is full of unbroken ice; all hands were on it chopping away, though the weather is very warm. In a shallow bay in this lake we surprised a whole shoal of splendid salmon trout; three or four were captured by the men with their hands. The Cariboo<sup>110</sup> tracks appear to be fresher than those hitherto seen. The rocks in this part of the lake are chiefly sandstone fit for the finest grindstones, and some granite.

Mond. 9th. This day has been employed battling against ice by making portages (3) of about 2½ miles in total length—chopping and pushing ice aside we rounded a deep bay and reached a point about 3 miles in a direct line from our encampment of last night. We are again stopped by ice and a similar day's work is before us. Wind as usual h.<sup>111</sup> and cold; it froze hard last night and began to freeze at (—27—) 9½ p.m. when we encamped. One of our canoes narrowly escaped destruction by being nipped between two fields of ice—they actually met but by shoving poles under her the ice went under her bottom; all the canoes slightly damaged notwithstanding all our care. A Canada goose shot today. One of the Indians injured his foot by letting a bag of Pem'n tumble on it—our sick man still unable to work. Ther. 39 air; 34 water.

Tuesd. 10th. Wind N. N. E. and piercing cold. The ice all froze in a solid mass, and to give it time to soften we left only at 10 a.m. The whole day was spent in breaking through ice and making portages—of the latter 4 were made, say 1½ miles. We are obliged to round all the

110. Barren Ground Caribou, *Rangifer arcticus*. (R.M.A.)

111. High?



bays; some of them were very deep. I really think we have not made ten miles of direct distance. We are now in a bay, the N. and N.E. portion of which is formed of sandhills and is, I trust, the Sandhill Bay of Back. We have still much ice to break through before reaching the bottom. The men, notwithstanding their working among ice and water, are in famous spirits, and many a joke and laugh is raised at the expense of those who run a risk of breaking through weak portions of the ice—in general it is about  $2\frac{1}{2}$  to 3 feet thick and sound except close along (July, 1855, *Lake Aylmer*—28—29—) shore. Encamped at 10½ p.m. Unable to set the nets.

Wed. —11th. Wind mod. and variable; cloudy with occasional showers. Left our encampment at 11 a.m.; having waited to allow the ice to soften a little. Just before starting a crack appeared at the next point, across to the other shore; along the side we were on was choked by ice, and though the risk was great I was determined on attempting it; fortunately the wind was very light, and after a sharp paddle we got safe through. We then had 4 hours of uninterrupted paddling, when ice again barred the road. Another crack appeared in the ice which we immediately entered and re-crossed to the opposite side. We were as nearly crushed as possible; 2 canoes only succeeded in crossing, the third had to retreat and take a passage across higher up. We then with the exception of a discharge reached the bottom of what we considered Sand Hill Bay of Back. All our Indian guides were ignorant of this particular

portion, having come either from the River falling into this Lake or from Clinton Golden Lake<sup>112</sup> overland. On surmounting a high sand hill we immediately recognized Sussex Lake from (July, 1855, *Great Fish River*—30—) Sir G. Back's admirable drawing. The river running from it is nearly dry, and we are now cutting across to an elbow of the river by a chain of these ponds and portages; the first one is made—rocks, granites, with occasional sand hills—some of the rocks nearly white with plates of tale—<sup>113</sup> in some of the bays yesterday sandstones appeared. I never saw a region so destitute of animal life—since leaving Slave Lake, we have seen a white wolf and a marmot,<sup>114</sup> some divers, perhaps 20 Canada geese, as many gulls, a few plover, some bands of grouse and a few small birds.<sup>115</sup> One Indian has lamed himself and our sick man is still hors de combat—; fortunately, notwithstanding the dreadfully severe labor they have undergone, the others are well and full of spirits.

(To be continued)

112. Should be Clinton-Colden.

113. Probably calcite.

114. Wolf, *Canis lupus*; the "marmot" is Parry's Ground Squirrel, *Citellus parryi*. (R.M.A.)

115. Divers, probably Red-throated Loon, *Gavia stellata*, and Yellow-billed Loon, *Gavia adamsi*; Canada geese, *Branta canadensis*; gulls, probably Herring Gulls, *Larus argentatus*; plover, probably either Semipalmated Plover, *Charadrius semipalmatus*, or Golden Plover, *Pluvialis dominica*; grouse, two species of Ptarmigan, *Lagopus*, as already noted. Small birds could belong to a number of species common in the region. (P.A.T.).

## FIRST ONTARIO RECORD OF THE SUBGENUS MICTOMYS

By STUART C. DOWNING<sup>1</sup>



NORTHERN Bog Lemming, *Synaptomys borealis* (R.O.M.Z. No. 13,211) was collected at Moosonee, Ontario, on July 25, 1939, by Gerald H. Clawson, a member of a survey party from the Royal Ontario Museum of Zoology. The specimen was trapped on the open bank of a small creek draining a spruce bog. The immediate vicinity was comparatively dry for this region, with scattered large spruce trees and deep mossy ground cover. This is the first-time *Synaptomys borealis* has

been recorded from Ontario.

In the following discussion comparisons are based on data given by A. B. Howell (Revision of the American Lemming Mice, *North Am. Fauna*, No. 50, 1927).

The specimen, an immature male, measured as follows: Total length, 121 mm.; tail 22 mm.; hind foot, 20 mm. The skull was so badly smashed by the trap that but two conventional measurements are available: Rostral breadth, 4.8 mm.; interorbital breadth, 3.3 mm. In body size the specimen approaches *S. b. medioximus*, while the two skull measurements are the same as the type

<sup>1</sup> Royal Ontario Museum of Zoology.

of *S. b. innuitus*.

The head is clay colour (Ridgeway). The animal is moulting on the back and rump and the colour band of the new hair approximates sayal brown. The tail is slightly bicoloured, being a little paler beneath. In colour the specimen is different from *S. b. borealis* or any of the eastern races.

Godbout, Quebec, six hundred miles to the east and Lake Winnipeg, Manitoba, seven hundred miles to the west, are the nearest points from which the species has been recorded. A. B. Howell (*loc. cit.*) and E. C. Cross (*Journ. Mam.*, vol. 19, No. 3) have tentatively suggested that an undescribed form probably occurs between the eastern and western races of *Synaptomys borealis*. Although the Moosonee specimen is geographic-

ally isolated and exhibits characters differing from the known forms, lack of material makes it inadvisable to describe a new race from this single specimen.

The third mandibular molar exhibits an anomaly. Typical of *Mictomys* in other respects, this third molar has a closed outer triangle. This tooth is not completely erupted and it is conceivable that further wear could reduce the tooth surface to a point where the outer triangle would no longer be completely closed. M. A. C. Hinton (*Monograph of the Voles and Lemmings*, vol. 1, 1926) has pointed out that this character is subject to individual as well as age variation, and has warned against the taxonomic value placed on it by many authors.

## REVIEWS

**LURE OF THE NORTH**, by Richard Finnie. David McKay Co., Philadelphia; 227 pages, 8vo.; 56 illustrations on 16 pages inserted and numbered with the text. 1940. Price \$3.50.

As recently as 1916 there were still many Canadian Eskimos living in the manner of their forefathers. Today the aeroplane, most modern of conveyances, calls regularly at the settlements established in their midst, and the apparatus of civilization is in every man's hand. They have had to make, in one generation, adjustments that the white race took ten thousand years to make.

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It is clearly shown that the story-book Eskimo is gone, but where men are judged by their manhood there is obviously much to be said for the hybrid Eskimo of today.—C.H.D.C.

ready identification of macroscopic aquatic plants. In this timely book Professor Fassett provides a profusely illustrated key to the identification of such plants in the north-eastern United States, west to the prairies, and the adjacent parts of Canada, in flowering, fruiting and sterile conditions.

In the appendix are listed in detail established records for the use of each plant species by game birds and mammals, cross-indexed under the animal species and supported by an extensive bibliography. Uses of various species of plants to fish are also given.

There is a glossary, and an index both to text and illustrations, the whole providing a most useful work of reference.—C.H.D.C.

**A MANUAL OF AQUATIC PLANTS** by Norman C. Fassett. McGraw-Hill Book Company, Inc., New York and London; 382 pages 8vo., numerous illustrations; 1940. Price \$4.00.

As the field of conservation enlarges a great many people are becoming concerned with the

**ANNUAL REPORT OF THE PROVINCE OF QUEBEC SOCIETY FOR THE PROTECTION OF BIRDS, INC.** Montreal, 1940, pp. 1-119.

The activities of the Society in 1939 are summarized. In addition, there is a ten-page resumé of bird observations, including a map of the distribution of the Wood Thrush in the Montreal region. The observer is identified in each case, which will be useful to anyone wishing to cite a particular observation.—C.H.D.C.

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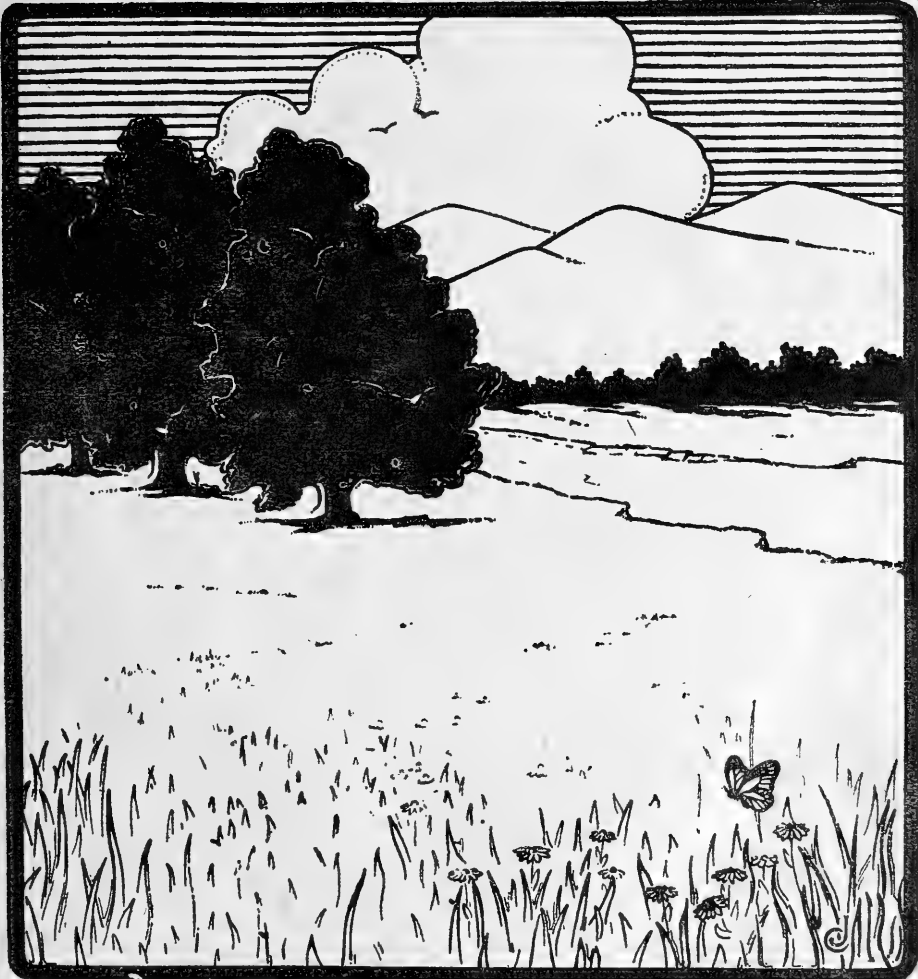
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PLATE I



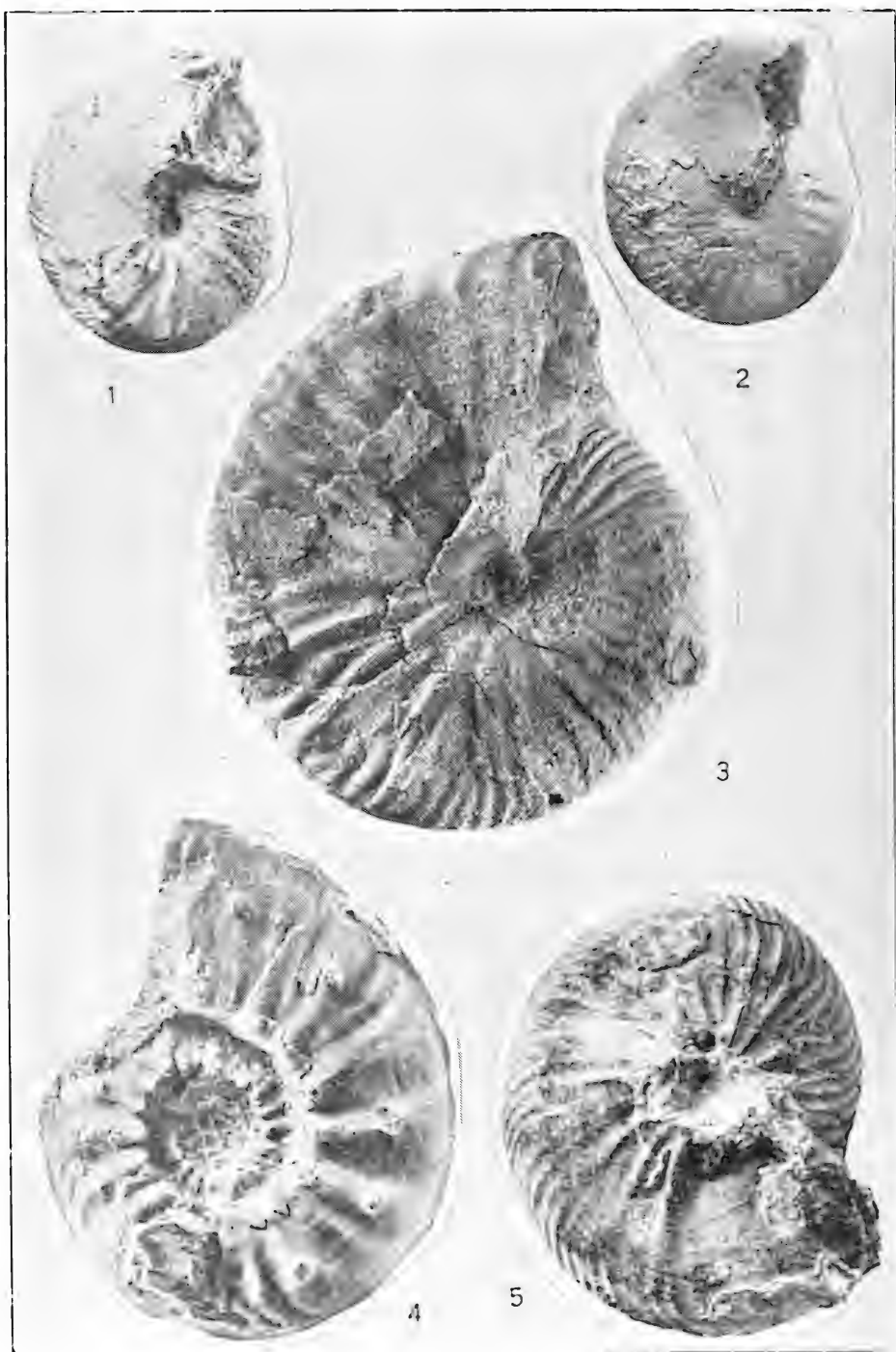


PLATE II-





PLATE III

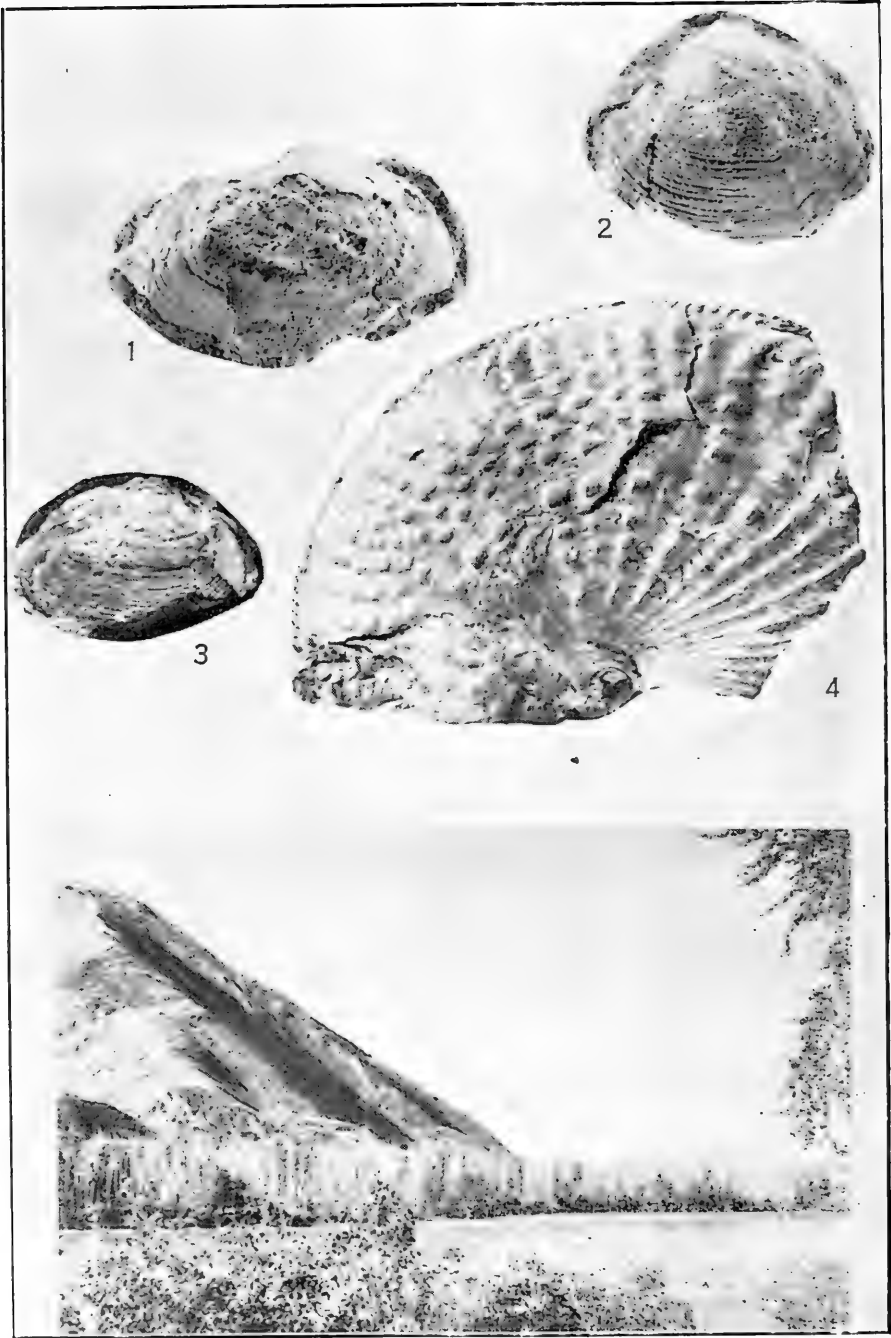


PLATE IV

# The Canadian Field-Naturalist


VOL. LIV

OTTAWA, CANADA, NOVEMBER, 1940

No. 8

## PRELIMINARY STUDY OF SOME TRIASSIC PELECYPODS AND AMMONOIDS FROM THE PEACE RIVER FOOTHILLS. B.C.<sup>1</sup>

By F. H. McLEARN

 PRELIMINARY descriptions of twenty new species and varieties of Triassic pelecypods and ammonoids from the Peace River foothills, B.C., are given in the following pages. It is hoped that a more adequate treatment, including additional illustrations, will follow in later papers or in a monograph on the Peace River Triassic.

All types cited are in the collections of the Geological Survey at Ottawa.

*Halobia pacalis* n. sp.

Plate III, figures 7, 8

The outline is somewhat oblique and about as high as long to somewhat longer than high. The beaks are somewhat in advance of the middle of the long hingeline. The large anterior ear is definitely delimited and flatly arched, except along the dorsal margin where it is low and flat. The surface of the umbonal part of the shell is covered with fine, radiating costae, beyond which in most specimens the costae are deflected and then resume a radiating direction, resulting in a zig-zag pattern. Beyond and on the greater part of the shell are radiating, fine and wavy or crinkly costae, mostly finer and less distinct on the posterior part and less crinkly, but fine, on the anterior part. In some specimens there is a narrow, smooth area along the dorsal margin, posterior to the beak. The median part of the anterior ear has curved varices of growth and the upper and lower parts have straight, fine, radial costae. There is considerable variation in fineness of ornament.

*Halobia superbescens* Kittl is smaller, has yet finer ornament and has a posterior, triangular area demarcated from the remainder of the shell.

*Halobia comata* Bittner is not accurately figured and the type specimen is imperfect; it does not appear to have the zig-zag ornament and may have coarser ornament.

The species *Halobia praesuperba* Kittl, *H. cordillerana* Smith and *H. ornatissima* Smith, have the zig-zag ornament and the fine and crinkly ornament on the middle and posterior parts of the shell. They do not, however, have this ornament also on the anterior part of the body of the shell as in the Peace River specimens, but have there, instead, coarse, straight, radical costae. It is interesting to note that in some Peace River specimens having coarser costae, they are straight just under the anterior ear, but are always much finer there and occupy a smaller part of the surface than in *H. praesuperba*, *H. cordillerana* or *H. ornatissima*. The close relation of the Peace River shell to this group of species, however, is manifest.

All these species are very variable and some, including our own, should have, possibly, in a broader view, only the status of varieties.

In a previous paper this species has been listed as *Halobia* cf. *superbescens* Kittl.

*Name.* *Pacalis*, betokening peace.

*Types.* The holotype, cat. No. 8804, is from Pardonet hill and the paratype, cat. No. 8800, is from Twin Spruce gully, West Brown spur.

*Halobia symmetrica* var. *lata* n. var.

Plate III, figure 1.

In general proportions and ornament this variety resembles *Halobia symmetrica* Smith very closely. The proportions in the umbonal part of the shell, however, as indicated by the course of growth lines and undulations there, are different. In the typical species the outline at this stage is about as high as long, but in the variety *lata* it is longer than high and the beaks are considerably in advance of the middle of the hinge-

<sup>1</sup> Published with the permission of the Director, Mines and Geology Branch, Department of Mines and Resources, Ottawa Canada.

line. In the growth of the shell of this variety the outline advances from longer than high to about as high as long and the beaks change in position from considerably in advance of the middle to nearly central.

Some right valves are quite convex, particularly in the umbonal region.

*Name.* *Latus*, wide

*Type.* The holotype, cat. no. 8809, is from the Halobia zone, Twin Spruce gully.

*Myophoria silentiana* McLearn

Plate IV, figures 1 to 3

1939. *Myophoria silentiana* McLearn, *Can. Field-Nat.*, vol. 53, Nov. 1939, p. 118, pl. 1, fig. 2.

The holotype is compressed, due partly to distortion but mostly to a poor development of what may be called the lower radial fold on the post-umbonal slope. An upper radial fold is better defined.

A variety to which the name *schooleri* is given, is more convex because of a more prominent "lower radial fold" which swells out all of the posterior part of the shell and demarcates a wide area between it and the dorsal margin. This area is convex because of a broadly rounded "upper radial fold". On the holotype of this variety the wavy costae show in the shallow sulcus in front of the post-umbal slope and there are some shallow varices of growth.

In var. *placida* n. var. (*placidus*, peaceful) there are two rather faint, radial costae, one near the middle and one at the anterior border of the sulcus.

There is also variation in the number and depth of the varices of growth. A few specimens are almost free from them and on these the ornament is more regular and even. Another variation is in the depth of the sulcus. These differences however cannot be recognized in separate varieties. Indeed this is a very variable species and the use of the names proposed above may not prove desirable after experience with larger collections.

The wavy costation in the sulcus is very characteristic of this species. The costae, but usually not the varices of growth, tend to weaken in the sulcus.

*Types.* The holotype, cat. no. 8758, of the species, the holotype, cat. no. 8810, of the var. *schooleri*, and the holotype, cat. no. 8812 of var. *placida*, are from the *poiyana* zone on the Dry Canyon shoulder.

*Myophoria morigera* n. sp.

Plate III, figure 6

The shell is moderately convex and a little longer than high. The beak is nearly central. The surface on the post-umbonal slope is abruptly infolded to form a bevelled edge, above which there is a convex area divided by a small, very narrow, thread-like, radial groove. There is a broad, very shallow, radial sulcus in front of the post-umbonal slope. Fine, fairly even, concentric costae cover all the anterior part of the shell and continue posteriorly, on the ventral part of the shell almost to the post-umbonal bevelled edge. They are slightly wavy in the shallow sulcus. There are two, low, radial costae in the sulcus. Height of holotype, 26mm.; length, 30 + mm.

*Myophoria silentiana* McLaren lacks the bevelled edge on the post-umbonal slope, has the costae more wavy in the shallow sulcus and has radial costae only in the variety *placida*.

*Name.* *Morigerus*, pleasing.

*Type.* The holotype, cat. no. 8813, is from the *poiyana* zone on the Dry Canyon shoulder.

*'Pecten' ? dishinni* n. sp.

Plate III, figure 4

Shell fairly convex, about acline in the lack of any appreciable obliquity, mostly about as long as high, with fairly long hingeline, well rounded ventral margin and comparatively large ears. The "right" ear is separated from the body of the shell by a well defined, auricular sulcus and a variably, but mostly abruptly, rounded, umbonal fold; the "left" auricular sulcus is not so well defined as the "right" and the "left" ear is only obscurely delimited. The body of the shell is covered with 8 or 9, radial, widely spaced ribs of variable strength. The ears are ornamented only with varices of growth. Height of holotype, 18.0 mm.; length, 17.0 mm.

*Eumorphotis nationalis* Smith has relatively smaller ears and many more and finer, radial costae.

*Name.* *Dishinni*, semi-mythical enemies of the Sekani.

*Type.* The holotype, cat. no. 8815, is from talus of the *poiyana* zone on the Dry Canyon shoulder.

*'Pecten' ? dishinni* var. *kaska* n. var.

Plate III, figure 9

Compared with the species, this variety has more radial costae, due to additional intercalated, radial costae arising at a stage of growth

corresponding to a height of about 12 mm. Height of holotype, 21.0 mm.; length, 19.0 mm.

*Name.* Kaska, an Indian tribe.

*Type.* The holotype, cat. no. 8814, is from the *poynana* zone on Kerr spur.

*Juvavites concretus* n. sp.

Plate I, figures 3, 4

This is a fairly large, fairly involute species, with stout, rounded whorls, about as high as thick, and rounded, umbilical shoulder. The coarse, elevated ribs are curved a little on the sides and somewhat arcuate on the venter. The ribs variably divide near the umbilicus and near the middle of the sides, forming groups of two, three or four ribs. At the anterior end of the last whorl there is a second and variable stage of ribbing where ribs are widely spaced and are single due to loss of bifurcation or decline and atrophy of one branch. In the holotype widely spaced, single ribs are present beyond a growth stage of 58 mm. In the paratype wide spacing of the ribs begins at 66 mm. and the ornament approaches a single rib stage by decline in strength of one branch each of the bifurcated ribs. There is thus variation in the stage at which the second style of ribbing appears, some variation in that style and there is also variation in the size and proportions of whorls.

Compared with *Juvavites magnus* McLearn, the whorls are stouter and thicker.

*Name.* *Concretus*, gross.

*Types.* The holotype, cat. no. 8818, and the paratype, cat. no. 8819, are from the *Halobia* zone on West Brown spur.

*Juvavites mclayi* n. sp.

Plate III, figure 10

This is a rather compressed, involute species with much higher than thick whorls, almost flattened, somewhat convergent sides, convex venter and rounded, but well defined, ventral shoulders. There are numerous, fine, even, rounded costae, nearly straight on the sides, but arcuate on the venter, continuous across the venter on the shell and mostly so on the core. The costae are broad and of low relief on the anterior part of the living chamber.

Compared with *Juvavites (Anatomites) laevicostatus* Mojsisovics, our species is larger, has more even costation, better defined ventral shoulders and, apparently, no constrictions. Compared with *Juvavites angulatus* Diener, it is more

involute, has blunter ribbing and the ribs on the venter form a more obtuse angle.

*Name.* In honour of A. B. McLay.

*Type.* The holotype, cat. no. 8792, is from the *Halobia* zone at the west end of McLay spur.

*Juvavites selwyni* n. sp.

Plate II, figure 3

This is a fairly compressed, involute species with rounded, umbilical shoulder. Near the anterior end of the living chamber the venter broadens and flattens and rounded, ventral shoulders are formed. There are two stages of ornament. The posterior half of the ultimate whorl has nearly straight, rounded ribs curved forward a little near the venter. Most ribs divide just outside the umbilical shoulder and again on the outer part of the sides. On the anterior part of the ultimate whorl the ribbing is not so even; strong ribs alternate with low, indistinct ones and are slightly convex forward on the sides and only bent forward a little on the ventral shoulder. In addition two rows of indistinct tubercles appear near the outer ends of the ribs. The ribbing is not continuous across the venter, but, at maturity, several shallow furrows cross it.

Compared with *Juvavites subinterruptus* Mojsisovics and *Juvavites kellyi* Smith the whorls are more compressed, the venter broadens and flattens at the anterior end and faint tubercles are present. In *Juvavites chamissoi* Mojsisovics the ribbing disappears at maturity and the tubercles are larger and more distinct.

*Name.* The species is named for A.R.C. Selwyn.

*Type.* The holotype, cat. no. 8820, is in the *Halobia* zone on *Juvavites* gully, Pardonet hill.

*Juvavites custi* n. sp.

Plate II, figure 2

This is an involute, species with variably stout, slightly higher than thick whorls, flattened to gently convex sides, rounded to almost flattened venter, rounded, ventral shoulders, deep, steep-walled umbilicus and rounded, umbilical shoulder. On the posterior part of the ultimate whorl of the holotype are small, low, distant costae, nearly straight on the sides, but curved forward somewhat on the ventral shoulder. The surface is nearly smooth in the anterior part of the same whorl, except for some inconspicuous, faint, irregular, radial ornament. The fairly long lobes and deep saddles of the suture line are moderately indented.

The whorls are somewhat stouter, the venter wider and more flattened, and the ribs are coarser, more irregular and more distant than in *Juvavites bococki* McLearn.

*Name.* The name is given for an early Trader in the Peace River foothills.

*Type.* The holotype, cat. no. 8821, is in the talus of the *Halobia* zone, just east of *Juvavites* gully, Pardonet hill.

*Juvavites (Gonionotites) rarus* n. sp.

Plate III, figure 5.

The shell is very compressed and extremely involute. The venter widens and is nearly flat at maturity. From what remains of the shell and from the core, it is inferred that the surface of the later whorls is almost smooth, there being nothing more than indistinct ridges and shallow varices of growth. What appear to be specimens of the early whorls have a very fine, almost striate ornament. The low saddles and short lobes are moderately denticulate.

The inner whorls of *Gonionotites discus* Gemmellaro, have stronger and coarser ribbing and the saddles are higher and the lobes longer in the suture line. The ornament on the last whorl of *Gonionotites haugi* Gemmellaro is more pronounced and the suture line has more and somewhat higher saddles.

*Gonionotites vincentii* Gemmellaro has a much more pronounced sculpture on the inner whorls and fewer saddles in the suture line. The venter of *Gonionotites irmintrudis* Diener widens at a much later stage of growth, if at all. The suture line of this species is not available for comparison.

*Name.* *Rarus*, thin.

*Type.* The holotype, cat. no. 8833, is from the *Halobia* zone on the west slope of West Brown spur.

*Juvavites (Gonionotites) fuscus* n. sp.

Plate I, figure 1.

The whorls are much higher than thick, have nearly flattened, convergent sides and narrow, rounded venter. The umbilicus is fairly small and the umbilical shoulder is abruptly rounded and almost angular. The core is nearly smooth, having only very faint, irregular ribs or undulations, nearly straight on the sides and curved forward near and on the venter. The short lobes and low saddles are modified by short denticulations. There is some variation in the degree of compression and in the width of the umbilicus.

The sides of the whorl are more flattened, the umbilicus wider and the umbilical shoulder more angular than in *J. (Gonionotites) rarus*.

*Name.* *Fuscus*, brown.

*Type.* The holotype, cat. no. 8835, is from talus of the *Halobia* zone on the west slope of West Brown spur.

*Juvavites (Gonionotites) belli* n. sp.

Plate I, figure 5.

The penultimate whorl is fairly thick, has a broadly rounded venter and numerous costae, bent forward a little at the venter. The ultimate or outermost whorl preserved is compressed, has a narrowly rounded venter, converging sides and is smooth. The two known specimens are probably not mature or the anterior end is broken off.

The outermost whorl is more compressed and the penultimate whorl has coarser ribbing than *Gonionotites maurolcoi* Gemmellaro. The costation of the inner whorls is somewhat coarser than in *Gonionotites noricus* Diener. The inner whorls are thicker than those of *Gonionotites waldthauseniae* Welter. The compression of the shell is greater than in *Gonionotites hyatti* Smith, the ribbing is stronger on the inner whorls, there is no ventral ridge and the ultimate whorl is smoother.

*Name.* In honour of A. H. Bell.

*Type.* The holotype, cat. no. 8834, is from talus of the *Halobia* zone on the west slope of West Brown spur.

*Juvavites (Malayites) butleri* n. sp.

Plate II, figure 5.

This is a compressed, fairly involute species. The whorl is much higher than thick, the sides almost flattened and convergent, the venter narrow and rounded and the umbilical shoulder well defined and rounded. The ribs are numerous, low, nearly straight on the inner part of the sides, curved forward near the venter and moderately spaced on the sides, but closer on and near the venter where extra ribs are introduced by intercalation and bifurcation. There is also fine strigation.

The ribbing is coarser, the shell is more compressed and the umbilicus larger than in *Malayites brouweri* Pakuckas. The shell is more compressed and the umbilicus is wider than in *Malayites indo-malayicus* Welter. The ribbing is better defined and coarser than in *J. (Malayites) dawsoni* McLearn.

*Name.* The name is given for Captain W. F. Butler, who ascended the Peace River in 1873.

*Type.* The holotype, cat. no. 8840, is from talus of the *Halobia* zone on the west slope of West Brown spur.

*Juvavites (Malayites) parvus* n. sp.

Plate II, figure 1.

This is a fairly, but variably, compressed, involute species with slightly convex, convergent sides, narrowly rounded venter, narrow umbilicus and well rounded, umbilical shoulder. There are low, irregularly shaped, rather distantly and unevenly spaced ribs, stronger on the inner part of the sides and becoming fainter and smaller, dividing and becoming more numerous and closely spaced near the venter. The ribs are bent backward near the umbilicus, are nearly straight on the middle of the sides and are bent forward a little near the venter. There is considerable variation in strength, form and spacing of ribs. There is fine and, in places, very fine strigation. The variably high saddles and long lobes are moderately indented.

The strigation is finer and fainter than in *J. (Malayites) dawsoni* McLearn. The ribbing is less well defined and more unevenly spaced than in *J. (Malayites) butleri* n. sp. and the strigation is finer. Compared with *Sagenites inermis* var. *striatus* Mojsisovičs, the ribbing and strigation are weaker and there are more numerous and more closely spaced ribs on the venter, which are curved forward a little and there are more elements in the suture line.

*Name.* *Parvus*, frugal.

*Type.* The holotype, cat. no. 8843, is from talus of the *Halobia* zone on Pardonet hill, just West of Juvavites gully.

*Sirenites pardoneti* n. sp.

Plate I, figure 2, Plate IV, figure 4.

In this compressed, involute species the sides of the whorl are gently convex to almost flat and converge to a narrow venter on which there is a narrow furrow, bordered by low, narrow "keels". The very small umbilicus has a high, steep wall and an abruptly rounded, umbilical shoulder. The sides have broad, low ribs, somewhat convex forward on the middle of the sides and are bent forward at their ventral ends. The low ribs bear rather wide low, rather irregular tubercles of which there are about 8 to 11 spiral rows. The ventral "keels" bear short, narrow ribs set at an angle to the venter, which gives it a corded or plaited appearance. In mature specimens the ribs decline in strength. At the very end of large and

mature specimens, the ornament becomes irregular, the tubercles become farther apart in radial rows and finally there are very slender ribs with small bullae. This is a very variable species and many specimens have finer ribs and smaller tubercles than the holotype. There is also variation in the stage of growth at which the finely ribbed-bullate ornament appears.

This species is very close to *Sirenites alixis* Diener and may be only a variety of it. The coarser presence of bullae at the anterior end seem to distinguish it. The ornament is coarser than that of the Indian figured specimen of *Sirenites elegantiformis* Diener. It resembles an unnamed Indian shell, labelled *Sirenites* aff. *vre-denburghi* by Diener.

In previous papers this species has been listed as *Sirenites* cf. *elegantiformis* Diener.

*Name.* The name is given for Jacques Pardonet, trapper and miner.

*Types.* The holotype, cat. no. 8844, and paratype, cat. no. 8845 are from the *Halobia* zone on Black Bear ridge.

*Pterotoceras caurinum* var. *arctum* n. var.

Plate III, figure 2.

This variety differs from the species in the flatter sides, the greater compression of the shell and the narrower umbilicus. The ribs number about forty, have the least relief on the middle of the sides, end dorsally in small, not very well defined bullae, and end ventrally in somewhat pointed clavae, which border the venter.

*Name.* *Arctus*, narrow.

*Type.* The holotype, cat. no. 8846, is from the *Halobia* zone on the west slope of West Brown spur.

*Himavatites canadensis* n. sp.

Plate III, figure 3.

This is a compressed, involute species with gently convex, almost flattened sides, almost flat venter, angular, ventral shoulders, narrow umbilicus and gently rounded, umbilical shoulders. On the sides are flat band-like, narrow, somewhat imbricating ribs which are convex anteriorly on the sides and bent forward near the ventral shoulder. Several rows of very small and faint tubercles are present on the sides of whorl. Each flat rib ends on the ventral shoulder in a very small, denticulate clavus, the two denticles of which are small, irregular and poorly defined. Outside this row of clavi and bordering the almost flat, almost smooth, narrow venter is a

row of small tubercles or denticles, mostly corresponding in size and number to the denticles on the clavi of the ventral shoulder.

This species differs from *Himavatites columbianus* in many features, including lack of enlarged clavi or ears and lack of large lateral spines.

*Type.* The holotype, cat. no. 8847, is from talus of the *Halobia* zone on the west slope of West Brown spur.

*Distichites gethingi* n. sp.

Plate II, figure 4.

This is a moderately evolute, compressed species with convergent, almost flattened whorl sides, definite, but rounded, ventral shoulders, narrow venter, very narrow, ventral furrow, relatively high, but small, bordering keels, rounded, umbilical shoulder and a wide umbilicus. There is a row of short spines on the umbilical shoulder and a row of longer spines on the side of the whorl. Fairly strong, but low, ribs are straight between the spines and curved strongly forward on the ventral shoulder. On the anterior half of the last whorl of the holotype, the strong ribs with lateral spines are widely spaced and are separated by one or more weak ribs without lateral spines.

Compared with *Distichites pudens* var. *fatuensis* Welter, the ventral shoulders are better defined, the sides of the whorl are more flattened and there is a more pronounced alternating ornament of stronger ribs with spines and weaker ribs without spines.

*Name.* Named for the Gething family of Hudsons Hope.

*Type.* The holotype, cat. no. 8849, is from talus of the *Halobia* zone on Black Bear ridge.

#### DESCRIPTION OF PLATES

##### PLATE I

- Figure 1. *Juvavites (Gonionotites) fuscus* n. sp. Holotype. Geol. Surv. colls., cat. no. 8835.
- Figure 2. *Sirenites pardoneti* n. sp. Paratype. Geol. Surv. colls., cat. no. 8845.
- Figure 3. *Juvavites concretus* n. sp. Paratype. Geol. Surv. colls., cat. no. 8819.
- Figure 4. *Juvavites concretus* n. sp. Holotype. Geol. Surv. colls., cat. no. 8818.

- Figure 5. *Juvavites (Gonionotites) belli* n. sp. Holotype. Geol. Surv. colls., cat. no. 8834.

##### PLATE II

- Figure 1. *Juvavites (Malayites) parvus* n. sp. Holotype. Geol. Surv. colls., cat. no. 8843.
- Figure 2. *Juvavites custi* n. sp. Holotype. Geol. Surv. colls., cat. no. 8821.
- Figure 3. *Juvavites selwyni* n. sp. Holotype. Geol. Surv. colls., cat. no. 8820.
- Figure 4. *Distichites gethingi* n. sp. Holotype. Geol. Surv. colls., cat. no. 8849.
- Figure 5. *Juvavites (Malayites) butleri* n. sp. Holotype. Geol. Surv. colls., cat. no. 8840.

##### PLATE III

- Figure 1. *Halobia symmetrica* var. *lata* n. var. Holotype. Geol. Surv. colls., cat. no. 8809.
- Figure 2. *Pterotoceras caurimum* var. *arctum* n. var. Holotype. Geol. Surv. colls., cat. no. 8846.
- Figure 3. *Himavatites canadensis* n. sp. Holotype. Geol. Surv. colls., cat. no. 8847.
- Figure 4. '*Pecten*'? *dishinni* n. sp. Holotype. Geol. Surv. colls., cat. no. 8815.
- Figure 5. *Juvavites (Malayites) butleri* n. sp. Holotype. Geol. Surv. colls., cat. no. 8833.
- Figure 6. *Myophoria morigera* n. sp. Holotype. Geol. Surv. colls., cat. no. 8813.
- Figure 7. *Halobia pacalis* n. sp. Paratype. Geol. Surv. colls., cat. no. 8800.
- Figure 8. *Halobia pacalis* n. sp. Holotype. Geol. Surv. colls., cat. no. 8804.
- Figure 9. '*Pecten*'? *dishinni* var. *kaska* n. var. Holotype. Geol. Surv. colls., cat. no. 8814.
- Figure 10. *Juvavites mclayi* n. sp. Holotype. Geol. Surv. colls., cat. no. 8792.

##### PLATE IV

- Figure 1. *Myophoria silentiana* var. *schooleri* n. var. Holotype. Geol. Surv. colls., cat. no. 8810.
- Figure 2. *Myophoria silentiana* var. *placida* n. var. Holotype. Geol. Surv. colls., cat. no. 8812.
- Figure 3. *Myophoria silentiana* McLearn. Holotype, refigured. Geol. Surv. colls., cat. no. 8758.
- Figure 4. *Sirenites pardoneti* n. sp. Holotype. Geol. Surv. colls., cat. no. 8844.

View of Peace river, Pardonet hill on the left, the Rocky Mountains in the far background.



## THE SNOWSHOE RABBIT ENQUIRY 1938-39

By DENNIS CHITTY AND CHARLES ELTON

### 1. GENERAL INTRODUCTION.



CHANGES IN numbers of the snowshoe rabbit or varying hare (*Lepus americanus*) have been followed by means of a questionnaire enquiry in Canada since 1931-32, in Alaska since 1933-34 and in the United States since 1934-35 (*The Canadian Field-Naturalist*, 47: 63-69, 84-86, 1933; 48: 73-78, 1934; 49: 79-85, 1935; 50: 71-81, 1936; 51: 63-73, 1937; 52: 63-72, 1938; 53: 63-70, 1939.)

During the eight year period so far covered by the Canadian enquiry a peak in numbers has been reached and passed; and in 1937-39 various stages of recovery were reached except in the Yukon. In Alaska great abundance was reached later than in Canada generally, with local evidence of decline. In the United States the cycle had reached and begun to pass the bottom.

A report for 1937-38 has already been published, but the replies were mapped and analysed on a different system from that introduced for 1938-39. In order to compare results in the two years the replies for 1937-38 are also mapped on the new system, and those for previous years will be mapped in the same way later.

The mapping work at Oxford has mainly been carried out with the aid of a grant from the Carnegie Institution of Washington whom we wish to thank.

We are grateful to Mrs. Mary Nicholson for her help with the records and maps.

### 2. CANADA, (D.C.)

#### ACKNOWLEDGEMENTS

There were 579 reports (corrected figure) for 1937-38 and 595 for 1938-39, the latter provided by men in the following organisations: Royal Canadian Mounted Police (146 observers). Provincial Game Departments (151), National Parks (73), other observers (52); Hudson's Bay Company (153); Biological Board of Canada (20 observers in New Brunswick and Nova Scotia). 422 of these replies were forwarded by the National Parks Bureau, Department of Mines and Resources, Ottawa, to whom and to the Hudson's Bay Company and Dr. Huntsman of the Biological Board we are very grateful for so much assistance.

### METHODS

For the years 1931-38 maps have been given to show two things: (1) opinions about changes in the numbers of snowshoe rabbits and about epidemics; (2) the areas (exaggerated about twice) to which these opinions applied. The map of Canada and the U.S. was marked off in squares of 30 miles to a side and all the squares were counted which were partly or entirely covered by the areas described. These squares then became units for expressing the percentage by area of the country said to be experiencing increase, decrease, no change and epidemic in snowshoe rabbits.

Revision of this technique (which has been under consideration for some time) was carried out this year (1940) by D.C. and these new methods are introduced:

1. The country is marked off by a grid into squares of 30 miles to a side (as before).
2. The square which most nearly represents the centre of each observer's area is found (using large scale maps).
3. These squares are pencilled in on a blank map 100 miles to the inch.
4. Inside each square a circle is inked in.
5. Circles containing only increase opinions are shown black, decrease white, no change stippled.
6. If opinions in the same group are different the circle is divided up in proportion to the number of opinions of each kind. (For example if there are four observers two of whom say increase, one says decrease and one says no change, the circle is shown half black, quarter white and quarter stippled.

Two advantages of this method over the other are these: (1) the results are shown on one map instead of two; (2) where there are differences of opinion the proportion in which each is given can be seen. On the other system the opinion of one person, even if it disagreed with that of several others in the same group, was given equal prominence.

A difficulty about the new method is in obtaining figures to express the results shown on the map. There are often comparatively few observers reporting on large areas in the north, and a great many concentrated in small areas in the south. Thus, relative to their area, the more settled parts

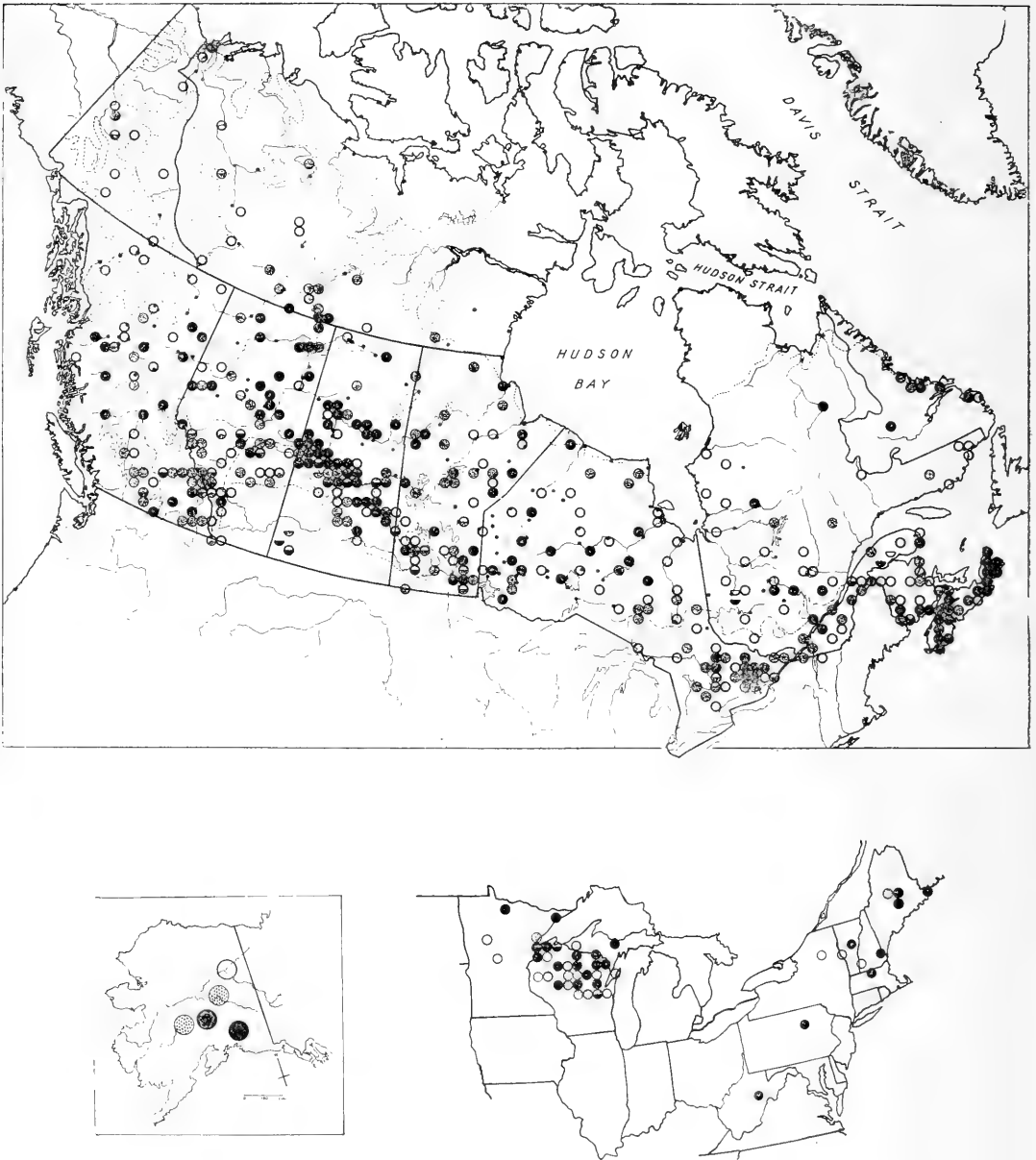


Fig. 1. Opinions about changes in abundance of snowshoe rabbits in 1937-38 compared with 1936-37. A circle indicates the approximate centre of an area reported on by one or more observers. Division of the circles is in proportion to the number of opinions of each kind given in the same circle. INCREASE reports are shown black, DECREASE white, NO CHANGE stippled. Black dots are Hudson's Bay Company posts. Broken lines in Canada show main vegetation zones. Thick black lines are Province or State boundaries.

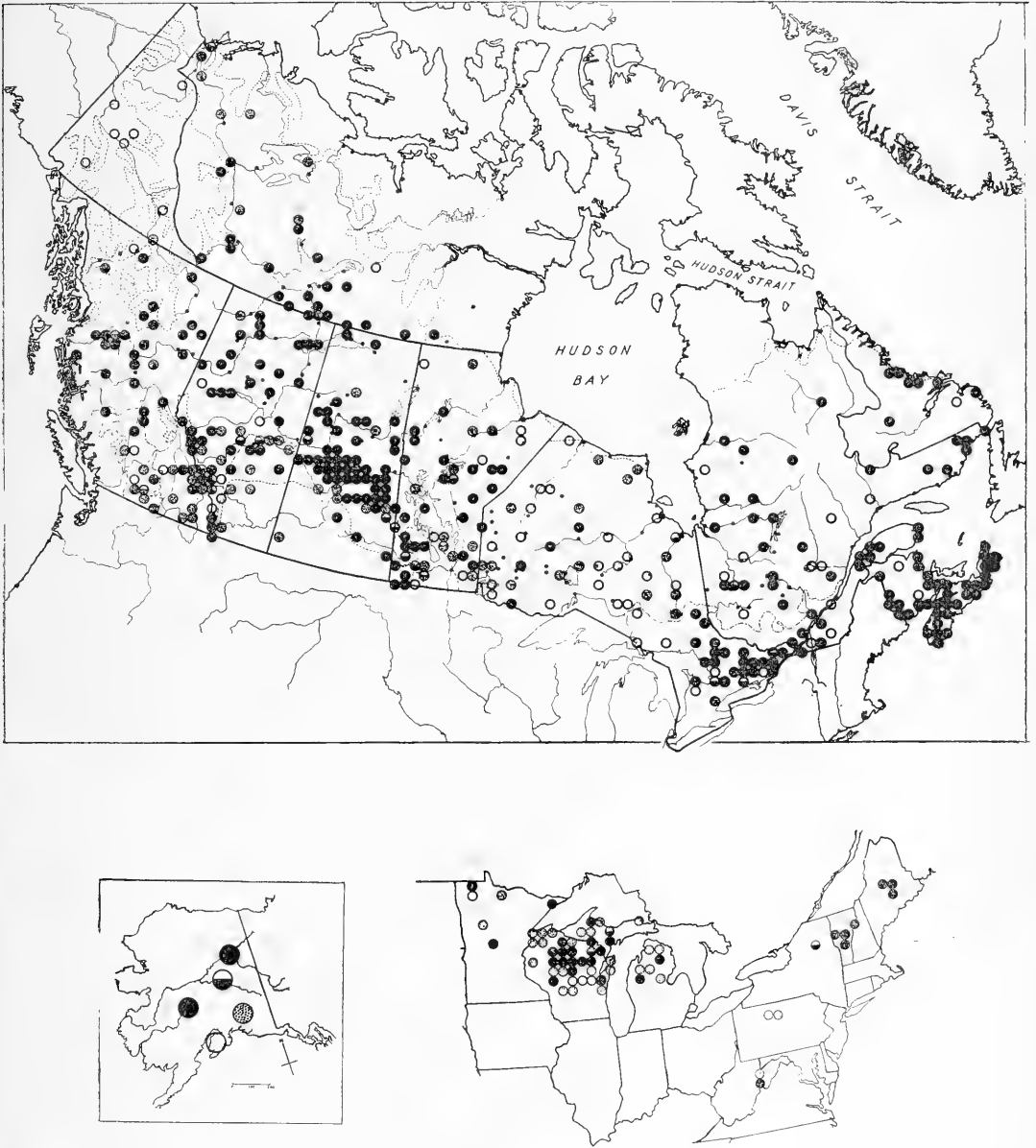


Fig. 2. Opinions about changes in abundance of snowshoe rabbits in 1938-39 compared with 1937-38. Symbols as in Fig. 1.

have a disproportionate number of observers and of circles. It was this difficulty that the former methods avoided.

When something is reported by a concentration of observers that differs from what is reported by those well scattered, the figure for the province as a whole is biased if a "vote" is taken. For example in north and central British Columbia (roughly 70% of the province) increase was almost universally reported for 1938-39; but in the south, where over half the observers were, a high proportion stated no change. The percentage of observers in British Columbia saying no change was thus as high as 37%; but the map shows that these reports refer to a relatively small part of the province. If the circles and fractions of circles are added up the index for no change is 30.5% and this again does not truly represent what was reported about the province as a whole. The best statement is probably this: "Between the 52nd and 60th parallels there were 31 observers in 29 groups, and 26 of these groups (90%) reported increase. Between the 49th and 52nd parallels there were 36 observers in 21 groups; only four of which groups reported increase (19%);  $\frac{3}{4}$  reported decrease (18%) and  $\frac{1}{4}$  no change (63%)."

A way is needed of putting this kind of statement into figures that can be used to measure the results year by year and to compare different regions. Such a method will not be presented until the data from previous years have been worked over, when, it is hoped, natural regions will have been defined which may be referred to in place of the political divisions. At present only the number and percentage of observers' reports is given, and it must be realized that these may be misleading.

An observer who gives different opinions about two areas is treated as though he were two observers each with a half "vote".

### RESULTS

The following conclusions may be drawn from the maps for 1937-39:

1. *Yukon*. In both years there was a general decline in snowshoe rabbits, and unlike most other parts of Canada no increase at all was reported during 1938-39. This is undoubtedly because the peak in numbers was reached and passed much later than elsewhere in Canada.

2. *Northwest Territories*. 1935-38 was a period of steep decline to the bottom of the cycle. Just north of the Alberta boundary there was a little

recovery in 1937-38 which became much more general the next year.

3. *British Columbia*. Northern British Columbia, like the Yukon and Northwest Territories, showed little recovery during 1937-38. The next year rabbits in the greater part of the province (north of about 52° North Latitude) were reported to be on the increase. Central British Columbia experienced some increase in both years, but in the southern parts only local variations were evident and the most common report was no change. Long-term fluctuations, if they exist here, may be different from those further north.

4. *Alberta*. There was a fair amount of increase in northern Alberta during 1937-38 and considerably more the next year. South of the Athabasca River this increase was not so well marked either year, which may mean that rabbits only just reached the bottom of the cycle.

5. *Saskatchewan*. In the central part of this province increase seems to have been fairly well established in 1937-38, but from the far north the reports are few in number and inconclusive for this year. In the lower parts of the grove belt little increase was noted in 1937-38. In 1938-39, however, almost the entire province seems to have had an improvement in snowshoe rabbit numbers, except in some parts near the edge of the prairie.

6. *Manitoba*. Here there was comparatively little improvement the first year; and in many parts of the north and of the south, this was also true the second year. There was, however, an appreciable rise in the reports of increase from 29% to 55%.

7. *Ontario*. In the south-east recovery was apparent in a small area in 1937-38 and in a larger area in 1938-39. It also seemed that recovery was definitely established over a wide stretch in northern Ontario east of the lower half of the boundary with Manitoba. For 1938-39, therefore, the drop in the number of reports of increase is rather unexpected in this area.

8. *Quebec and Labrador*. Recovery has gone ahead steadily in both years since 1936-37, when there were almost no reports of increase at all.

9. *New Brunswick*. Increase, which was reported mainly from southern New Brunswick in 1937-38, became more generally noticeable in the next year.

10. *Nova Scotia*. Rabbits on Cape Breton Island were almost unanimously reported to be well on the increase in 1937-38 and considerable abundance was reached the following year (when they were still reported to be improving). On the

ance was reached the following year (when they mainland increase was less noticeable the first year, but was fairly generally reported for 1938-39.

11. Numbers. Question 3 (b) for 1937-39 has been:

If possible please give examples, such as numbers shot or seen in a given time, with dates.

Not many observers have answered this ques-

tion, unfortunately; but it is hoped that more will do so as rabbits become generally abundant in the next few years. Three examples are taken to show the kind of information that is of most use in relating the comparative estimates to the abundance reached.

Mayo District, Y.T. "Very few seen. Perhaps ten during entire year."

TABLE 1  
Reports for 1937-38 and 1938-39 on the relative abundance of the snowshoe rabbit in Canada compared with the previous twelve months (ending May 31st).

		NO. OF OBSERVERS				% OF OBSERVERS OR SQUARES*		
		Increase	Decrease	No Change	Total	Increase	Decrease	No Change
Yukon....	1937-38	—	—	—	—	2-3	80-98	0-17
	"	1	8	1	10	10	80	10
	1938-39	0	7	1	8	0	88	12
Northwest Territories.	1937-38	—	—	—	—	5-9	52-71	21-44
	"	3	12	11	26	12	46	42
	1938-39	21	1	10	32	66	3	31
British Columbia..	1937-38	—	—	—	—	26-48	27-52	13-41
	"	18	19	30	67	27	28	45
	1938-39	34½	8	24½	67	51	12	37
Alberta....	1937-38	—	—	—	—	35-63	10-34	13-51
	"	27	31	33	91	30	34	36
	1938-39	46	12	28	86	53	14	33
Saskatchewan...	1937-38	—	—	—	—	33-75	9-41	12-47
	"	52	15	22	89	58	17	25
	1938-39	67	2	12	81	83	2	15
Manitoba..	1937-38	—	—	—	—	12-35	20-57	28-57
	"	18	22	23	63	29	35	36
	1938-39	35	13	16	64	55	20	25
Ontario....	1937-38	—	—	—	—	26-44	28-48	20-38
	"	23	29	28	80	29	36	35
	1938-39	22	31	25	78	28	40	32
Quebec and Labrador	1937-38	—	—	—	—	23-34	50-60	14-19
	"	15	32	13	60	25	53	22
	1938-39	38	13	9	60	63	22	15
New Brunswick.	1937-38	—	—	—	—	3-34	34-89	5-45
	"	8	9	7	24	33	38	29
	1938-39	18	2	3	23	78	9	13
Nova Scotia	1937-38	—	—	—	—	41-95	0-5	5-59
	"	32½	2	9½	44	74	5	21
	1938-39	52	1	5	58	89	2	9
Total.....	1937-38	—	—	—	—	23-43	31-53	16-40
	"	197½	179	177	554	36	32	32
	1938-39	333½	90	133	557	60	16	24

\*The figures in ordinary type are repeated from the last report. It is seen that the former system, on which they were derived, gives substantially the same result.

District No. 6. Prince Albert National Park, Sask. "Last year I saw two or three rabbits in a month. Last month I saw 33. They are still scarce."

Yarmouth County, N.S. "Party of five with no dog and using only 22 rifles, picked up 42 in six hours about Jan. 15th. This is considered good."

12. *Epidemics*. In 1938-39 there were reports, without description, of epidemics at Beauval, Sask., and Windigo, Ont.

#### UNITED STATES AND ALASKA (C.E.)

Observers reporting through the U.S. Bureau of Biological Survey have again supplied information about fluctuations of *Lepus americanus* in the Eastern United States and in Alaska. We wish to thank officials of the Biological Survey for their co-operation during a fifth year of this extension of the main enquiry, and especially Dr. H. H. T. Jackson, who organized the collection of questionnaire replies. Particularly full records were received from the Michigan State Department of Conservation; and from Mr. W. E. Scott of the Wisconsin State Conservation Department, who supplied reports from observers in the 71 counties of that state, and also figures for the numbers of snowshoe rabbits reported shot by hunters.

#### UNITED STATES

The total number of reports which could be mapped was 84, an increase of 29 over the previous season. They have been treated in exactly the same way as those in the Canadian enquiry this year, according to the new method worked out by Chitty *i.e.* instead of the *areas of observers* being plotted and then combined onto a general grid on the map, the *centres of the observers' areas* are marked, so that the maps show the number of such centres reporting different percentage categories of abundance falling into each thirty-mile sided square. In order to allow for any change introduced by this new system, the replies for 1937-38 have been re-analyzed and are included with the current ones in Table 2. The figures for previous years will also eventually be re-analyzed in this way. The results for 1937-38 by the old method gave: Increase 69-80%, No Change 11-20%, Decrease 7-8%; by the new method these become 56%, 26% and 18%. The general picture obtained, of a great deal of increase, some no change and a little decrease (that is, of the bottom of the cycle having been turned) is the same by each method. The greater proportion of increase shown by the old method is due chiefly to the large areas in New England reported by a few observers.

The same general situation appears from the reports for 1938-39, except that there is relatively more no change compared to decrease, the increase figure being very much the same. This indicates that the cycle has reached the bottom or begun to turn in a great many areas. The number of reports from individual states is mostly too small to permit of fine analysis, but in Wisconsin there are definite signs of the rising cycle, shown not only in the number of reports, but also by figures for the snowshoe rabbit kills in 1938, based on hunters' reports. These figures, well distributed over a number of separate counties, are probably some index of numbers. After falling steadily from a peak of 631,007 in 1932 to 60,081 in 1937, they rose by 40% to 83,906 in 1938. The reports of abundance show that 96% of observers considered that the snowshoe rabbits were either increasing or holding their own in Wisconsin, while of these 49% reported actual increase.

On the Lake Alexander area of Minnesota, where Dr. R. G. Green and his associates have for some years carried on intensive census and other investigations, the number of snowshoe rabbits to the square mile had increased from 32 in the early part of 1938 to 73 in the early part of 1939. (C. A. Evans). In Pennsylvania a special situation is reported: "Since the early '20s, when the Pennsylvania deer herd first began seriously to over-load the carrying capacity of the range, over-browsing by deer has gradually destroyed, region by region, the naturally sought after snowshoe habitats. The result has been a gradual reduction in the hare population. This has, generally speaking, made it impossible to discern cyclic tendencies which may exist in the rabbit population. In 1937, the snowshoe, because of its scarcity, was granted a year-round closed season, the first in history [of this State]. A limited open season was allowed in the fall of 1938, when the species seemed to be increasing; but with over 650,000 licensed hunters the total kill was only 2,100. Thus in 1939 the season once again has been entirely closed. All in all, it would appear that until the deer herd is reduced to a point more nearly commensurate with the available food supply, snowshoe rabbit is destined to remain within the State only in scattered areas of small size and only at a very low population" (Richard Gerstell). The same observer noted in 1937-38 that snowshoe rabbits exist in "swamp borders and other brush areas where over-browsing by deer has not destroyed the habitat".

In Vermont a complication has been brought

about locally by the introduction of snowshoe rabbits from Canada in order to re-stock the ground during the period of scarcity. "During the past three years the Chittenden County Fish and Game Club has stocked the county each season with snowshoe rabbits obtained from Canada. . . . In the town of Ripton in Addison County there has also been an increase in the number of rabbits during the past three years and in this latter case stocking has not been resorted to" (P. A. Moody). Another observer (F. J. Osgood Jr.) reporting for Rutland County and eastern part of Windham County says: "Increased number due in some cases to restocking with hares from the vicinity of St. Johns River, Canada. In Windham County increase in numbers may be due to concentration in trees blown down in the hurricane of 1938." However, other reports make it clear that in Vermont there has been a marked natural recovery in numbers, and in one area there was considerable actual abund-

ance. In *West Virginia* snowshoe rabbits are permanently protected by the state (M. Brooke).

It can be seen from the map that the cycle was rising over many parts of the northern area of the Eastern States (in conformity with recovery in some parts of Eastern Canada). It does not appear that any areas, except some in Vermont, could yet record any great abundance, most of the information suggesting the beginning of recovery after scarcity, or else the cycle reaching or passing the bottom. Continued increase may be expected for several years in those parts of the Eastern United States which take part in the general northern cycle. The new method of mapping introduces an element into the figures which is not supplied in Table 2. But analysis of the map symbols themselves has shown that there is a very close agreement in the results, by whichever method they are worked out: though it does not follow that this will always occur.

TABLE 2

*Records of Snowshoe Rabbit population trends in the Eastern United States*  
*Figures are numbers of observers reporting*

State	1937-38				1938-39			
	Increase	No Change	Decrease	Total	Increase	No Change	Decrease	Total
Maine.....	3	1	0	4	3	0	0	3
Massachusetts.....	1	0	0	1	0	0	0	0
Michigan.....	1	0	1	2	5	10	0	15
Minnesota.....	2	2	2	6	3	3	1	7
New Hampshire.....	1	0	0	1	0	0	0	0
New York.....	0	0	1	1	1	1	0	2
Pennsylvania.....	1	0	0	1	0	1	1	2
Vermont.....	2	0	2	4	8	0	0	8
West Virginia.....	1	0	0	1	1	1	0	2
Wisconsin.....	19	11	4	34	22	21	2	45
Total.....	31	14	10	55	43	37	4	84
Percentage.....	56	26	18		51	44	5	

## ALASKA

Six reports were received, four of them through the Alaska Game Commission's Executive Officer. The trend of snowshoe rabbit numbers in this region is not entirely easy to follow from the series of maps published, because there is a local variation in peak years, and there are not for all these points continuous records for every year since 1933. We can trace the situation changing from a general consensus of reports of increase in 1933-34 and 1934-35, through a period of locally great abundance followed by crashes or gradual decrease, to the present condition of scarcity or slight recovery from scarcity. At Fort Yukon on the upper part of the Yukon River, and at Fairbanks on the Tanana River, the main peak seems to have been reached in 1936-37. South of this at Copper Center on the Copper River, there was a peak in 1937-38, followed by scarcity. At McGrath on the Upper Kuskokwim River a peak was reached between 1934-35 and 1936-37 (the exact year not on record). We may take these samples as evidence that the height of the cycle has now been reached and passed in Alaska and that snowshoe rabbit numbers are probably comparatively low over wide areas.

In the maps it has been necessary to adopt a different convention for Alaska, because the scale of reproduction does not show up clearly small circles of only 30 mile diameter. We have therefore continued to use the conventional circle of 100 miles diameter previously employed. In most instances this corresponds to the area actually given in the replies, but in a few cases the latter is smaller than the map shows.

According to Otto M. Geist, University of Alaska, "Rabbits were rather scarce in the entire area (forty miles around Fairbanks). Where in the last two years rabbits were seen in **great** numbers, about one eighth or possibly one tenth of the total were present. Where I hunted dozens during fall in 1937-38, to feed a tame wolf and two great horned owls, in a single afternoon or evening only an occasional rabbit could be killed by me . . . It seems that the few remaining rabbits were in great demand by the owls, hawks and coyotes living in that region." For the region

between Kenai Mountains and Cook Inlet, and between Skilak and Tustumena Lakes, in Western Kenai Peninsula, (which is shown conventionally exaggerated in size on the map for 1938-39), L. J. Palmer of the U.S. Biological Survey reported that "During March, April and May, only 7 rabbits were seen in a 100 sq. mile area bordering Tustumena Lake being studied for management of moose. On a 150 sq. mile study unit bordering Skilak Lake only 5 rabbits were counted during Sept. and Oct. 1938. This spring, 1939, during May, June, and July no rabbits were noted on Tustumena Lake unit, but quite a few were reported seen at Kaslof during the winter and for the past three years."

## SUMMARY

For the year ending May 31st, 1939, there were 579 replies to the eighth annual questionnaire on changes in the abundance of snowshoe rabbits in Canada. Only 22 reports were of no use. Opinions have been mapped on a new system which shows their general distribution but not the full area to which they apply. The replies to the 1937-38 questionnaire have been remapped on the same system. Generally speaking these two years have been a period of recovery from the bottom of the latest ten year cycle, but there were well marked regional differences in phase. In 1938-39 rabbits in Nova Scotia had reached considerable abundance while in the Yukon no recovery had begun at all. Southern British Columbia, southern Alberta and much of northern Ontario were the other main exceptions to the general 1938-39 recovery. In most provinces rabbits were still scarce.

In the United States 84 reports for 1938-39 were mapped and those showed that in many areas increase had occurred, and that the bottom of the cycle had in most areas been passed. The influence of over-browsing by deer in Pennsylvania is noted as a cause hindering the development of the cycle in that State. Great abundance was not recorded yet from any areas except parts of Vermont. Six reports from Alaska indicate that the peak of the cycle has now been passed and that scarcity with or without slight recovery is widespread.

## ERRATUM

*In the last report (Canadian Field-Naturalist, 1939, Vol. 53) p. 64, col. 2.  
"2: for "decrease" read "increase".*



## CHIEF FACTOR JAMES ANDERSON'S BACK RIVER JOURNAL OF 1855

(Continued from page 109)

### July, 1855—THLEWYCHO RIVER—31

Th. 12th.<sup>116</sup> The day commenced by making 3 portages and traversing 3 small tarns, which brought us to the River<sup>117</sup> which is at present nearly dry—the distance from this Lake (Aylmer) is about 2 miles of portage and one of lake.<sup>118</sup> We then crossed it and made another portage of 1 mile to a small lake, after crossing which we made two more portages—the river being still almost dry—of  $\frac{1}{4}$  and 1 mile. We then encamped at 9 p.m.; men very tired and several lame. Mr. Stewart and I went on ahead to view our road and determine on the best places for portages—two are before us, one short and the other long. Saw 2 white wolves<sup>119</sup> and had a long shot at one of them—a grey wavy<sup>120</sup> was killed today. Our Indians are still ignorant of the route; we are guiding ourselves by Back's Journal—his description of the route is so minute and correct that it is needless for me to say anything. The wind was strong from the North and very cold. No mosquitoes tonight—they were in clouds this morning.

Frid. 13th. The men were so fatigued that I gave them an extra hour's sleep. We made 2 portages, one of  $\frac{1}{4}$  mile, the other  $1\frac{1}{4}$  miles over the angular debris of rocks; 4 men were so lame as to be unable to carry. We then proceeded (July, 1855—*Thlewycho River*—32) across the little Lake and Musk Ox Lake—Back's descriptions are excellent. I think he underestimated the distance between the Portage and Musk Ox Lake. Jay River was lost. The Island particularized by Back in the small lake is no longer

conical—the middle is sunk and the N.W. and S.E. ends raised like a saddle; the white rocks (are of gneiss) very little decomposed, the middle is in a complete state of disintegration; the rock first splits into squares of ice, then the angles are decomposed by the atmosphere and they assume the appearance of boulders and eventually are entirely decomposed forming round spots of gravelly earth a little higher than the moss which surrounds. The rocks may be seen everywhere in these regions in all stages of decomposition. At the head of Musk Ox Rapid we found a few copper Indians,<sup>121</sup> we purchased some meat for<sup>122</sup> them, and encamped a considerable distance down the Rapids, the entire loadings were run, except at one place where a decharge was made. From this encampment a sick man and 4 Indians will return. The former and one of the Indians proceed to join Mr. Lochart; the others will join their relatives at Clinton Colden Straits.<sup>123</sup> The expedition will now consist of 14 men, Mr. Stewart and myself. This will leave only 4 men for one canoe and 5 for the 2 others, 3 of whom are lame; these crews are quite insufficient; (July, 1855—*Thlewycho River*—33) I shall therefore leave one of the canoes either tomorrow or the day after. The weather was cloudy with slight showers of rain. We find enough of dry willows<sup>124</sup> to cook with; in Lake Aylmer we had nothing but heath. Saw a grouse today with its brood—it attacked me bravely. A wolf was also seen as well as a crow<sup>125</sup> and a few teal<sup>126</sup> which have long been strangers to us. On arriving opposite the Indian Lodges we found the carcasses of at least 20 deer<sup>127</sup> rotting along the Beach; it shows the improvidence of these people.

121. Called also Red Knives, now generally Yellow-knives, from their use of copper for tools and weapons. In historic times they hunted northeast of Great Slave and Great Bear Lakes. (D.J.)

122. From.

123. This place is known as Than-a-koie, a famous deer pass, and is shown on "Lockhart River Basin Map" issued by the Department of Interior in 1928. (M.G.C.)

124. This has been noted by others. In 1924 the writer found splendid growth of willow and alders about ten miles from Aylmer Lake and Ernest Thompson Seton in his book "Arctic Prairies" remarks on the same experience. Evidently Aylmer lake, with ice in it for about ten months of the year, acts as a refrigerator to all growth immediately adjacent. (M.G.C.)

125. Most likely a Raven, *Corvus corax* (P.A.T.)

126. Green-winged Teal, *Nettion carolinense*. (P.A.T.)

127. Barren Ground Caribou, *Rangifer arcticus*. (R.M.A.)

116. From here to the sea and return, Anderson refers constantly to Back's map of "Discoveries and Route of the Arctic Land Expedition in the Years 1833 and 1834", and all the place names used are to be found on this map, which should be consulted. (M.G.C.)

117. Back River, (M.G.C.)

118. This distance is exaggerated; actually the portage via the small lake measures about three-quarters of a mile. The river approaches within 700 yards of the lake and apparently at one time the two connected. This is not the main branch of Back river, as a few miles downstream, much larger streams enter and all unite to form Back river. (M.G.C.)

119. *Canis lupus* (R.M.A.)

120. White-fronted Goose, *Anser albifrons* (P.A.T.)

## EXPEDITION

James Anderson	Commanding
J. G. Stewart	2nd Commanding
Baptiste Assaminton <sup>128</sup>	
Joseph Anarin	Iroquois—Bows.
Janice Montours	
Thomas Mustigon	Mushkegon Steer'n
Paulet Papanaknis	" "
John Fidler	Half Breed Steer'n
Henry Fidler	
Edward Kipling	Half Breed Mid'n
Don'd McLeod	
Geo. Daniel	
Jeremiah Johnson	Mushkegon Mid'n
Joseph Bouche	Canad'n do
Murdock McLennan	Highland do
W. Reid	Orkney do

## July, 1855—THLEWYCHO RIVER—34

Sat. 14. Blowing a N.E. gale accompanied by rain and fog, which prevented us from leaving the encampment till 10½ a.m. We were obliged to carry most of the ladings for the remainder of the Rapids say half-way (2 miles) but the canals<sup>129</sup> and agrets<sup>130</sup> were run with difficulty and rather damaged, particularly one of the Resolution ones, the bark of which is most wretched. Sent back the men I mentioned with the 4 Indians. The ladings were carried at the Rapid where Back nearly lost his boat, but the canoes were merely lifted over a ledge of rock and were now<sup>131</sup> safely with all the agrets. We encamped close to the spot—a little below it—where Capt'n. Black repaired his boat and which he left on the 8th at 10 a.m. Two of our present weak crews are so lame that they cannot carry. Encamped at 8½ p.m. 2 nets were set as fish appear to be numerous. 2 Musk Oxen<sup>132</sup> were seen at the Rapid of that name.

Sund. 15. Left at 4 a.m. The nets produced nothing, though the fish were visibly numerous;

this is attributed to the extreme clearness of the water. Ran 10 Rapids with full ladings, except at 2 rapids where Mr. Stewart and myself, 3 men per canoe and 6 pieces were put ashore. Encamped at 9¼ p.m. at the foot of Malley's Rapids some distance below Capt. Back's encampment of July 9th. I do not find the Rapids nearly so bad as I was led to expect by Capt. Back's (July, 1855—*Thlewycho River*—35) narrative—the water is certainly lower than it was when he passed, which renders them in this part of the river worse. Saw some Canada geese. A cache of 1 bag Pemmican was made exactly where Back made his first cache. Wind still N.y.; squally with showers of rain. A little before encamping saw a reindeer<sup>133</sup> but could not pull ashore as we were just entering a rapid. When making this portage a big Musk bull<sup>134</sup> was discovered and I had the luck to knock him over; the men are now cutting him up. Query the quality of the meat. We shall sup on a goose shot by Mr. Stewart. The worst canoe was left at the cache. We are now rather deep, but get on well with 7 men per canoe. Some frozen snow was seen lining the shore of a rapid. 5 deer are now running about on the other side of the river; one is a fawn. Slate rocks on the beach at our encampment—and 2 or 3 small alders<sup>135</sup> which we have not seen for some time.

Mon. 16th. Our canoes required so much repairing that we could not leave till 10¼ a.m. All the rapids mentioned by Back were run without difficulty. The water must have been higher and the Rapids stronger when he passed.<sup>136</sup> Saw 4 deer and Fidler shot one; saw two bands of Musk Oxen, one of 5. (July, 1855—*Thlewycho River*—36) the other of 20 animals, besides 5 or 6 solitary bulls, but only one shot was fired at them; 11 gray waveys<sup>137</sup> were also run down. Back's description of the country is in general very correct but I did not perceive several branches of the river before arriving at L. Beechy, at the entrance or head of which we encamped at 9 p.m. Wind dead ahead and strong all day; weather cloudy and chilly. The rocks at our encampment composed of slate.

(to be continued)

128. Refer to footnote 56 for discussion of the crew.

129. Undoubtedly wrongly transcribed from "canot", the French word for canoe, carried over into voyageur English.

130. A voyageur—French word used consistently by Anderson for the personal kits of the men as opposed to the expedition stores.

131. Should be "run".

132. *Oribos moschatus* (R.M.A.)

133. Barren Ground Caribou. *Rangifer arcticus* (R.M.A.)

134. Musk-ox. *Oribos moschatus* (R.M.A.)

135. Northern Alder. *Alnus crispa* (A.E.P.)

136. Back passed here on July 10. (M.G.C.)

137. White-fronted Goose. *Anser albifrons* (P.A.T.)

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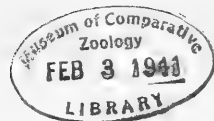
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No. 9

## THE NESTING OF ROSS'S GOOSE *Chen rossii*.

By P. A. TAVERNER



AMONG the puzzling breeding mysteries of our high northern American birds those of the Blue and Ross's Geese, *Chen caerulescens* and *C. rossii* remained the longest unsolved. The former was cleared up by Mr. J. D. Soper<sup>1</sup> under the auspices of the Northwest Territories and Yukon Branch of the Canadian Department of the Interior in 1929 when he found it nesting on the low lands (Blue Goose Plains) of southwestern Baffin Island, at the foot of Bowman Bay, off Foxe Basin. Immediately thereafter it was also discovered on Southampton Island at the mouth of Hudson Bay by G. M. Sutton<sup>2</sup> and later noted there by T. Manning and R. W. Bray, the latter of unhappy memory as it was while returning to the area in 1938 for further information on this and other species that he was blown to sea and perished in the stormy waters of Foxe Basin. The summering grounds of Ross's Goose remained unknown and the subject of interested conjecture and speculation until this past summer.

Ross's Goose, *Chen rossii*, Scabby-nosed or Horned Wavy or Galoot as it is known to various interests, is a small goose, scarcely larger than a big Mallard duck, and a miniature edition of the Snow Goose, *Chen hyperborea*, except that adults have a rugose, warty or scabby base to the bill and lack the strongly marked black "grinning patches" along the cutting edges of the mandibles of their "laughing" congeners. Under the name of "Galoot" it has been known in considerable numbers to the trading and other estab-

lishments of Lakes Athabasca and Great Slave, particularly at Chipewyan where formerly many were killed and salted as an important addition to the winter food supply. Of recent years however it has been greatly reduced in numbers and, though the above practice has been largely discontinued, the fear has been growing that, through the decrease in numbers increasing the difficulty of finding nesting concentrations, it might, like the Labrador Duck, disappear before we could obtain definite information upon its breeding life history. Fortunately this has, at least in part, been forestalled by the discovery of the past summer. We at least know where it nests though the difficulty of entry into the area is a serious obstacle to further intensive breeding study.

From these great northern lakes where it appeared in vast snowy flocks, in early summer it vanished north or northeast-ward into the blue, disappearing from human ken without trace. Southward its movements were almost as obscure. It occurred in scattered groups or casual individuals eastward rarely to Manitoba and westward to the coast but the main flight line in transit appeared to be through eastern Alberta and western Saskatchewan in irregular and somewhat uncommon and usually sporadic flocks, sometimes of considerable size but never, in total, commensurate with the known numbers of the species. The greater body passed over most of this territory unobserved but, somewhere along or below the International Boundary it crossed the mountains to the great interior valleys of California for the winter, where, with Lesser Snow Geese, *Chen hyperborea hyperborea* it was an important object of sport and many were killed. Since wholesale systematic hunting on the lakes of its northern route has been discontinued, the future of the species seems to rest largely with California. It has recently been given complete protection there and prospects for its survival appear more promising.

<sup>1</sup> Discovery of the Breeding Grounds of the Blue Goose, by J. Dewey Soper, *Can. Field Nat.*, XLIV, 1930, pp. 1-11. The Blue Goose, by J. Dewey Soper, Northwest Territories and Yukon Branch, Dept. of the Interior, 1930, pp. 1-64, King's Printer, Ottawa.

<sup>2</sup> The Exploration of Southampton Island, Hudson Bay, by George Miksch Sutton. *Mem. Carnegie Mus.*, Vol. XII, Part II, Section 2, The Birds of Southampton Island, pp. 1-167, plus Plates XIX-XXIV.



This discontinuous appearance along a line of migration is quite similar to those of its two close relatives, the Blue Goose and the Greater Snow Goose, *Chen hyperborea atlantica*. The latter winters in numbers on the middle Atlantic coast and occurs in similar concentration in passage on the lower St. Lawrence River near Quebec City. The former occurs in winter in large numbers with Lesser Snow Geese on the gulf coasts of Louisiana and Texas and in spring migration in southern Manitoba. Both Greater Snows and Blues are rare, irregular or casual between these points of observed concentration, and until lately their breeding grounds were unknown. The nesting of the Blues was discovered as above and that of the Greater Snows was found to be on the northeastern Arctic islands and north Greenland. The breeding ground of the Lesser Snow Geese is practically continuous across the arctic mainland coast and adjacent islands and its migration route is over a broad interior front without presenting much of exceptional interest. With the discovery of the nestings of these geese only that of Ross' Goose, remained unknown.

With the exception of mere casual occurrences, no word of the species could be obtained either by observation or inquiry along the main arctic coast east to King William's Island and there was no evidence that important numbers ever left the continental mass. Through the interior it was not found anywhere in the explored sections north or east of the big lake systems or from the Thelon River southward. The few reports from Back's River were equally negative. There seemed comparatively little ground yet to be investigated but by elimination the prospective field was narrowed to between Back's River and the hinterland of the arctic coast, and the terra incognita of the great peninsula north of Chesterfield and Wager Inlets. The latter however as far as we know is forbiddingly difficult of access and unpromising as a goose ground.

Owing largely to the personal and inspirational urging of Mr. E. F. G. White, the interest of Mr. R. W. G. Bonnycastle of the Fur Trade Department of the Hudson's Bay Company was aroused. Encouraged by suggestive native reports he authorized a company expedition up the Perry River emptying into the Queen Maud Gulf close to longitude 102° West. As no official maps have ever been made of this river subsequent localities cannot be clearly stated. June 30th of the past summer, Mr. Angus Gavin and Mr. E. Donovan, managers of Perry River and King William Land Posts respectively, with four

Eskimos started with canoe on dog-sled over the still present ice to the mouth of the river where they camped on an island occupied by a considerable colony of either Brant, *Branta bernicla*, or Canada Geese, *B. canadensis*, identity being uncertain in the hazy light. The next day they ascended the river in the canoe observing en route Swans, Geese, Cranes, and many Pintails to a branch where they spent the night at a native camp. Fifteen miles up this tributary, and over a number of difficult portages, they made their way to an unnamed lake. What they found there can be best reported in Mr. Gavin's words as contributed to him for publication in *The Beaver*, the official house-organ of the Hudson's Bay Company.

"After laboring up this (the last Rapids) we came to a mile or so of good water, and it was while we were on this calm stretch that the first Ross Goose was sighted in the early morning light, flying towards the lake that lay ahead of us."

"On entering the lake, we could see them flying all over the place. The lake was long and narrow, and studded with two or three hundred reefs of varying shapes and sizes up to about 500 by 50 yards. One of the islands nearest us was covered with white dots of the nesting geese. Through the glasses they reminded us of ptarmigan in winter garb. As we approached they rose in large flocks over our heads, loudly protesting at our invasion of their domain. Others took it very philosophically, and not until we had actually landed did they get off their nests."

"On the first three islands visited there were about fifty pairs nesting, anywhere from three to thirty-feet apart. A grassy base on the rock copiously lined and rimmed with white down, soiled to a dirty gray appearance, constituted the nest. The complete nest was about twelve inches over all with a nesting cavity about five inches in diameter and about two and a half inches in depth from the top of the downy rim. Four eggs were the most common clutch noted. There were two to six creamy-white, ovate eggs in the nests examined..... Some nests contained five eggs, some two or three and one or two had six eggs..... In all eggs the embryos were sufficiently developed so that the head, bill and eyes were clearly seen. Incubation was judged to be five to ten days

3 Where the Ross's Goose Nest, by A. Gavin, *The Beaver*, Outfit 271, December, 1940, Hudson's Bay Co., Winnipeg, Manitoba.



advanced. \_\_\_\_\_ "

"On this island we also discovered two nests of the King Eider, *Somateria spectabilis*, one containing five greenish eggs, the other six. Unfortunately, light conditions were not too good as it was in the small hours of the morning, so we did not get any close-up shots with our cameras. After securing a few specimens and their eggs, we headed for the next island to cook a meal, and to have a short nap before trying to get some pictures. Back at the island where the geese were nesting, we finally succeeded in getting some close-ups of the birds on their eggs. As we approached, they would get off their nests; but we would lie down five or six feet away, and presently they would return and sit on the eggs again."

"About three hundred yards from the first island visited, and in a grassy bay, on the mainland, four pairs of Blue Geese, *Chen caerulescens*, were found nesting, and the nests examined. They were grass-lined cavities with considerable dusky, bluish-grey down (two of them) containing four and three eggs respectively. Some of the older natives told us they had never before set eyes on this bird. They explained, however, that Ross's Goose was common thereabouts, the chief breeding grounds being on a similar island in a larger lake about six miles away. We gathered from their description that about two thousand would be found nesting there."

"Altogether we stayed about seven hours at the lake, \_\_\_\_\_  
On the return trip we saw about five hundred Pintails, *Dafila acuta*, in a marsh about half a mile long and a quarter wide. At least half of them were in flightless condition, having moulted their primaries. Other species seen on this trip were Canada Geese, *Branta canadensis*, Whistling Swans, *Cygnus columbianus*, Arctic Terns, *Sterna paradisaea*, and several species of shore birds and gulls."

In corroboration of the above identifications there have been received and we have examined a number of clear, sharp photographs of eggs and nests and of birds, both White and Blue upon nests; also two skins of Ross' Geese and five end-blown but otherwise perfect eggs. Without further data the photographs of the nests of course cannot be specifically recognized nor would the identity of the white geese be certain were they not supported by the skin specimens. The pictures of the Blue Geese, however, with their

white heads and necks, and dark bodies are unmistakable. Note that in the above account there is no mention that can be referred to either the much larger white Snow Goose or to the quite different White-fronted Goose, *Anser albifrons*, both of which might be reasonably expected to occur.

The five eggs are stated by Mr. Donovan, who came out with them, while Mr. Gavin remained in the north, as probably from one set though he is not certain that they may not be from two adjoining clutches. They are ovate, creamy white somewhat nest stained, and with almost imperceptible gloss. They sort into two groups, two eggs being distinctly smaller than the other three. The following are the measurements with those of series of Snow and Blue Geese in the National Museum of Canada for comparison. The volumetric measurements were obtained by measuring the water they displaced in a graduate marked to two cubic centimeters. It can be noted that the only other known egg of Ross's Goose is one laid in confinement and given by Bent<sup>4</sup> as measuring 74 x 47 mm. which is in harmony with the larger group of these figures.

SNOW GOOSE				cu. cm.
				volume
Southampton Island				
Set 785	82	x 53	mm.	130
	82.5	x 53.5		129
Camp Kungovik, Baffin Is.				
Set 2057	81	x 53		120
	81	x 53		122
	78	x 53.5		116
	80	x 53		114
	81	x 54		126
Perry River, 1936.				
Single egg	80	x 54		110

ROSS' GOOSE				cu. cm.
				volume
No. 1	66.5	mm. x 48		76
No. 2	64	x 48		73
No. 3	72	x 48		82
No. 4	75	x 48		87
No. 5	71	x 49		90

4. Life Histories of North America Wild Fowl, by Arthur Cleveland Bent, Order Anseres, Bulletin 130, U.S. Nat'l. Mus. 1925.

## BLUE GOOSE

		cu. cm. volume
Camp Kungovik, Baffin Is.		
Set 2041 .....	83 x 54.5 mm.	120
	76 x 49	87
	80 x 54.5	122
	84 x 55	123
Camp Kungovik, Baffin Is.		
Set 2044 .....	82 x 52	109
	82 x 52.5	109
	84 x 52	116
	78 x 48.5	105
Camp Kungovik, Baffin Is.		
Set 2045 .....	85 x 52	123
	83.5 x 51.5	114
	81 x 52	112
	82 x 52	112
Camp Kungovik, Baffin Is.		
Set 2043 .....	83 x 50	109
	82.5 x 51	114
	80 x 51	110
Camp Kungovik, Baffin Is.		
Set 2042 .....	81.5 x 49.5	101
	79 x 49.5	94
Camp Kungovik, Baffin Is.		
Set 2050 .....	76 x 51	99
	74 x 50	96
Camp Kungovik, Baffin Is.		
Set 2052 .....	78.5 x 53.5	110
	79 x 53.5	110
	79 x 55	115
Camp Kungovik, Baffin Is.		
Set 2051 .....	79 x 53	114
	86 x 53.5	118

Though the primary interest in these discoveries lies with Ross' Goose, the nesting of the Blue Goose is of immediately second importance to it suggesting a westward extension of some six hundred miles to the known breeding range. It is impossible as yet to say how extensive this new nesting area of the species may be or how continuous it may be with that already known. The native report cited suggests that it is of rare or casual occurrence in this immediate neighborhood, but a specimen in the National Museum of Canada of a hybrid *caerulescens* X *albifrons* taken at Chipewyan in 1913 gives hopes of other occurrences from this approximate range.

Little is known of the physiography of this section of the country which constitutes one of the larger of the great unknowns of the continent. The Perry River area, probably to Back's River seems to be a low-lying coastal plain of low relief, an old sea bed somewhat similar to the ground where the Blue Goose has already been found nesting. East of lower Back's River the land is generally high and rugged and promises little if any suitable Blue Goose ground. But all this is a matter for future investigation when exploration facilities in this difficult country are further developed. Great credit is due to the Hudson's Bay Company for sponsoring, and to its officers for their initiative and energy in successfully carrying out the search. It may be remarked in passing that Ross's Goose was named in 1861 after Bernard Ross, a Hudson's Bay Company officer at Fort Resolution, whence the first specimens were sent by Kennicott. It was described as the "horned wavy" by Samuel Hearne, another Hudson's Bay Company officer in 1795, and he must have seen it on the barrens on one or more of his trips. Now, in 1940, two Hudson's Bay Company officers share the discovery of its nest.

## THE EUROPEAN PRAYING MANTIS (*Mantis religiosa*. L) IN ONTARIO

By F. A. URQUHART and C. E. CORFE



**D**URING the past few years the European Praying Mantis has become definitely more abundant in the vicinity of the Toronto region. This suggested to us that the praying mantis was extending its range westward from its point of abundance in the vicinity of Prince Edward County. Up to the summer of 1937 our records indicated that the range of the praying mantis extended from Cooks-

ville on the west along the north shore of Lake Ontario to Kingston on the east (Corfe, *Can. Ent.*, LXX: 21-22). Since this time a number of other records have been obtained showing that the range now extends from Fort Erie on the west to Spencerville and Ottawa on the east. The most northerly record is Miner's Bay in Haliburton County.



FIG 1: Showing the present distribution of the European Praying Mantis in Ontario.

Referring to the accompanying map, it would seem that the range extension is definitely westward from the vicinity of Prince Edward County. It may be predicted that within a short period of time the praying mantis will range along the north shores of Lake Erie, Lake Ontario and the St. Lawrence River, from Windsor on the west to Lancaster on the east. Once established, the praying mantis will most likely occur along the north shore of Lake Erie in numbers equal to its present status in Prince Edward County. It is quite unlikely that it will extend its range northward, as pointed out later in the present paper the records from Miner's Bay and Ottawa are most likely accidental, transported by motor car or on shipments of goods.

The following are the localities from which the praying mantis has been reported or taken: Toronto, Kingston, Bowmanville, Beamsville, Belleville, Colborne, Orono, West Hill, Picton, Willowdale, Rouge River, Consecun <sup>1</sup>(C.N.C.), Ameliasburg (C.N.C.), Lake Opinicon (C.N.C.), Spencerville (C.N.C.), Ottawa (C.N.C.), Fort Erie, Deseronto, Miner's Bay, Port Perry, Scarboro, Cooksville, Kingston, Colborne, Green Point, and Cobourg.

Of the numerous specimens of praying mantis brought to the museum during the summer of 1939 three specimens, two females (one brown,

one green) and one male, received on August 22, were kept in captivity; grasshoppers were used as food. Copulation took place between the male and the green female on August 26, and between the same male and the brown female on August 27. The male died, without any apparent injury, on August 28. On September 16 an egg cocoon was deposited by the green female. A second egg cocoon, that was decidedly smaller than the first, was deposited on September 28. From September 23 to October 3 the remaining female became gradually weaker; the tarsi of all the legs apparently became brittle and eventually broke off with the result that the specimen was unable to cling to the sides of the cage. The eyes became decidedly black in colour and the head a peculiar shade of pink. The tegmina and wings became dry and brittle. The whole ageing process seemed to be a gradual drying up of the entire body. The specimen died on October 4.

The egg cocoons, surrounded with cotton wool, were placed in a small cardboard box; the latter, also surrounded with cotton wool, was placed in a second larger box. The boxes containing the eggs were placed in a wood cupboard out-of-doors during the winter months. On June 12 the eggs were brought in doors but apparently the winter cold had destroyed the eggs; sections made through the eggs showed them to be completely desiccated.

1. C.N.C.; Canadian National Collection, Ottawa.

An egg cocoon, collected by Alec Lucas at Cobourg "during November" and sent to the Museum on March 20, was kept at room temperature and, on April 22, some fifty nymphs emerged.

This rather simple experiment would seem to

indicate that the cold of winter is a deciding factor in preventing the praying mantis from extending its range northward; and that in the vicinity of Toronto only those eggs deposited in sheltered situations would survive.

## SOME STUDIES IN BILL MEASUREMENTS AND BODY WEIGHTS OF AMERICAN WOODCOCK (*Philohela minor*)

By R. W. TUFTS

**D**URING the fall hunting seasons (October 1–November 15) of 1938 and 1939 in Nova Scotia 255 Woodcock were examined by the writer—71 in 1938 and 184 in 1939—many of these specimens having been supplied by my hunting companions. In 1938 all birds were sexed by internal examination and all bill measurements recorded. In 1939 all bills were measured but only those specimens (14 in number), concerning the sex of which there was any reason for doubt, were so examined and in every one of these cases my supposition, based upon external characteristics, was confirmed.

### STUDIES IN BILL-LENGTHS.

Of the 255 birds cited above, 121 were males and 134 females. The measurement taken in each case was that of the distance from the tip of the upper mandible to the point where the frontal head feathers begin.

The average length of the bills of the 121 males was 63.46 mm., the shortest being 59 mm., of which there were 3, and the longest 69 mm., of which there was but one.

The average length of bills of the 134 females was 71.89 mm., the shortest being 66 mm., one only, and the longest 78 mm., of which there were 2.

From the foregoing it will be noted that there was some slight overlapping, the extent of same being as follows:

25 males had bills which measured between 66 mm. and 69 mm. inclusive—18 were 66 mm.; 5 were 67 mm.; 1 was 68 mm.; and 1 was 69 mm. Of the females there were 17 birds with bills measuring between 66 mm. and 69 mm. inclusive—1 was 66 mm.; 3 were 67 mm.; 8 were 68 mm.; and 5 were 69 mm.

A study of my compilations in this connection reveals another fact which seems noteworthy in

that the bills of both sexes were found to increase in length during the short span of the open hunting season as will be seen from the figures submitted below:

	Oct. 1-15	Oct. 16-31	Nov. 1-15
19 males		69 males	33 males
av. 63.04 mm.		av. 63.47 mm.	av. 64.24 mm.
31 females		49 females	54 females
av. 71.36 mm.		av. 72.00 mm.	av. 72.22 mm.

These figures also support the theory that in the late autumn just prior to departure for the south, female birds predominate, the majority of males having left earlier. By years the figures are:

		Oct. 1-15	Oct. 16-31	Nov. 1-15
1938	Males .....	7	27	0
	Females ..	18	14	5
1939	Males .....	12	42	33
	Females ..	13	35	49

### BODY WEIGHTS

Of the 255 specimens above mentioned, 71 were taken in 1938 but only one of them was weighed. This was such a large bird that I took it to a druggist and had him weigh it on his delicately balanced gram scales. The bird, female, weighed 276.41 grams (9¾ oz.) and had a bill measurement of 72 mm. Of the 184 examined in 1939, 179 were carefully weighed on similar scales and results recorded. The sex ratio of the 1939 lot was 87 males to 97 females and the 5 that were not weighed were all females, leaving 87 males and 92 females to be considered below.

The average weight of the 87 males was 175.81 grams, while the average weight of the 92 females was 219.2 grams. The heaviest male weighed 218.6 grams and was shot on October 30th in Kings County. The bill length of this bird was 66 mm. The lightest male weighed 132.1 grams and was taken on October 19th in Kings County. The bill measured 59 mm. The heaviest female weighed 256.7 grams and was shot on November 14th in Digby County. The bill measured 75 mm. The lightest one weighed 173.5 grams, bill 73 mm., and was shot on October 20th in Kings County.

A study of the increase in body weights during the 6 weeks open season reveals the following:

Oct. 1-15	Oct. 16-31	Nov. 1-15
Males 12	Males 42	Males 33
av. 159.90 gms.	av. 174.60 gms.	av. 180.11 gms.
Females 13	Females 31	Females 48
av. 201.85 gms.	av. 216.09 gms.	av. 226.00 gms.

#### GENERAL NOTES

During my 40 years of Woodcock hunting I have seen, on a number of occasions, evidence which supports the belief that the sexes travel separately during the autumn migration. From my field notes, which have been compiled since 1922, I have culled the following which, in this connection, seem pertinent:

"Oct. 14, 1931—Shot 8 birds today in a new cover near Bridgetown, Annapolis County, 7 of which were unquestionably males, judging from their small size. The type of cover in which they were found, and their general behavior as well, marked them as birds which were migrating or 'drop birds' as they are called by hunters."

"Oct. 15, 1931—Today in 'South Mountain Cover,' Kings County, I shot 8 birds—7 females and one male."

"Nov. 3, 1931—Of 5 taken today in 'Black River Cover,' Kings County, 4 were females."

"Nov. 9, 1935—5 taken in 'North Mountain Cover,' Kings County, all of which were females, judging from large size."

"Oct. 21, 1937—4 taken today were all large females."

"Nov. 8, 1937—Shot 8 in 'Porcupine Cover,' Kings County, all of which were large females."

"Oct. 8, 1938—Took 8 'cock today. 6 were females. One a male and the other a small bird full of pin-feathers and sex indeterminate, probably a male."

"Oct. 25, 26, 1938—All males taken these 2 days (9 in all taken)."

"Oct. 28, 29, 31, 1938—All birds taken these 3 days were males with a single exception (8 in all)."

"Nov. 5, 1938—5 taken today, all females."

"Oct. 2, 1939—Of 8 taken today, 6 were males."

"Oct. 19, 1939—'Cassidy's Cover,' Kings County, held 10 to 12 'cock and of the 7 of these taken, all were small males. These were found in an area not exceeding 2 acres."

"Oct. 20, 1939—Today 8 birds were shot and of the lot 7 were females—no fat birds."

"Nov. 1, 1939—3 males taken today were all on a half acre. The females (2) were widely separated."

Concerning the time of departure of the Woodcock from Nova Scotia, there appears to be a wide variation. It is generally known or believed that they leave for the New England shores from the southern end of Yarmouth County and from the southern tip of Digby Neck, which is in Digby County. Some observers contend that they cross over the Bay of Fundy, by the shorter water route, to the Islands of the Grand Manan group, which are in Charlotte County, New Brunswick, close to the international border, and from there continue southerly through Maine.

Some 50 Woodcock have been banded in Nova Scotia and New Brunswick in recent years, but to date no recoveries have been reported. In time, however, some much needed light may be thrown on this subject by the timely recovery of one or more of these banded birds.

The time in November, when the last wave of migrating woodcock leaves, varies from early in the month (rarely) up till the end, and not infrequently they hang on until well into December. For instance, on December 18, 1930, numbers of them were reliably reported to have been seen in Yarmouth County by boys who were out after rabbits and some birds were said to have been shot while sitting on the snow. Occasionally individual birds are reported from Yarmouth County during January and February as having been seen in sheltered spring-fed swales which do not freeze. It is quite possible that such occurrences are attributable to birds which have recovered

from wounds, from which they were suffering at the normal time of their departure, and which rendered long flight at that period a physical impossibility.

A belief held by some local Woodcock fans is that the time of their annual fall take-off is closely related to the period of the November full moon and that it is also strongly influenced by light northerly winds which may prevail at that time. This is not always so, however, for at times they appear to take no notice of such conditions.

Though well known as being birds of nocturnal habits in the matter of migration, I have a single record of one performing what appeared to be a

migratory flight in the daytime. This was a bird seen in Kings County about 4 p.m. on October 31st, 1931, headed due west (toward Yarmouth County) and flying at an altitude of about 60 yards. Outlined against the dull sky, I chanced to see it coming from a long distance and watched it fly overhead and finally pitch into an alder thicket about 400 yards distant.

With the many and increasing adverse factors with which these birds have to contend, it is a marvel to many observers how the species is able to maintain its numbers as well as it appears to be doing.

## CHIEF FACTOR JAMES ANDERSON'S BACK RIVER JOURNAL OF 1855

(Continued from page 126)

Tuesd. 17. Left our encampment at 2¼ a.m. and passed Lake Beechy with a fine breeze aft. A complete portage was made at the Cascades; all the Rapids below it were safely run with full cargoes, with the exception of one where the canoes were lightened of a few pieces and 3 men each. The current carried us on very swiftly and we encamped at 9¼ p.m. at the "Sand Cliffs" passed by Back on the afternoon of the 16th instant his description of the scenery is most correct—it is beautiful indeed. The mosses which are in full flower, and in patches on the cliffs, with their green leaves and purple flowers on the cream-coloured sand, look most beautiful. Back saw immense numbers of reindeer and Musk Oxen in this part of the River; we saw but 10 of the former and about 40 of the latter—28 of these were in one drove; (*July, 1855—Thlewycha River*—37) they were of all sizes—the calves look like black pigs. Killed 4 Canada geese and 18 waxies, <sup>138</sup> which are now moulting—they gave all hands a severe run to catch them. I saw a doe and her fawn cross a narrow part of L. Beechy; 2 wolves were waiting for them; the poor creature was in a sad dilemma, afraid to return on account of us and to land for the wolves—we shouted and drove the wolves off and I trust the poor animals escaped their fangs. Observed a great change in the temperature since leaving Lake Beechy—it is much warmer; Cap. Back observed the same

thing and accounted for it by the distance from Bathurst Inlet being increased. Made a cache of a bale of dried meat at our encampment of last night, and of one bag Pemican at the head of the Cascades of Beechy's Lake.

(Case contains 7 lb. Tobacco, 3 lb. Powder, 6 lb. Tea, 1 lb. Chocolate, some ball, soap and sundries).

July, 1855—THLEWYCHO RIVER—38

Wed. 18th. Left our encampment at 4¼ a.m. The canoes were lightened at the 2nd cascade and portages made at the 1st Cascade and the "dalles" previous to arriving at Baillie's R.; that stream is now only a few yards in width, tho when the water is high it is evidently an imposing stream. Encamped at 9 p.m. about half way between Baillie's and Warrens River. 24 Canada geese were killed, they are all males—no young ones are to be seen. A few Musk Oxen and deer were seen. The weather was clear and warm. I searched minutely for the Esquimaux marks mentioned by Back but saw none, either on the banks of the River or on the gneiss mountains mentioned by Back. Along the bank of the River small stones were often found placed one on the top of the other, but this is evidently done by the washing away of the sand from the stones. Two of Dr. Rae's men say that they do not resemble Esq. marks.<sup>139</sup> I saw nothing of the old

138. Probably White-fronted Geese, but without the adjective "Gray" they might be Snow Geese, *Chen hyperborea*. (P.A.T.)

139. Anderson's description is rather vague. A small stone placed on top of a larger one commonly marked the spot where an Eskimo had shot down a caribou; but single boulders and piles of boulders served many purposes. (See Jenness, D., *The Life of the Copper Eskimos*, Report of the Can. Arctic Expedition, Vol. XII, Pt. 1, p. 148). (D.J.)

encampments. 3 kinds of gulls<sup>140</sup> were seen. Cache of a bag of pemmican and a case at It Cascade.

Thurs. 19th. Raining and blowing a gale from N.E. which prevented us from leaving till 6¼ a.m. About 1 p.m. it began to rain and did not cease till we encamped at 6½ p.m. at the head of the Hawk Rapids. Just before we encamped it rained so heavily and blew so hard that the Bowsman could not distinguish the leads. Saw no Musk Oxen (July, 1855—THLEWYCHO RIVER—39) we did not go after them, as we have plenty of fresh provisions, having killed 31 large male Canada geese; at one run of 10 or 15 minutes hundreds of these birds were seen. The so-called Esq. marks are seen on the edge of every sandy or gravelly hill, but no where else; they point or run in every direction according as the River runs. Blue Lupins<sup>141</sup> are found here in great perfection, and several other flowers, among others the dandelion. Warren and Jervoin<sup>142</sup> rivers were dry.

Frid. 20th. The night turned out fine but cold and the morning was a lovely one. The rapids were run safely; at this stage of the water though strong they are not dangerous. Just before reaching McKinley's River we saw fresh Esq. caches of deer along the water's edge and crows<sup>143</sup> were seen. Shortly after their tents were seen, 6 men, one of them blind, came down, but they attempted nothing hostile. From signs they made they came down McKinley's R. and most probably belong to the Chesterfield Inlet tribe.<sup>144</sup> Their boats<sup>145</sup> (July, 1855—THLEWYCHO RIVER—40) were made of deerskins and Musk Ox soles, and their canoes of deer parchment, paddles of spruce, spear heads of iron; one of their women had bracelets of round common beads, and the oldest man brought down some wolf and white fox<sup>146</sup> skins to trade, which we could not take at present. I gave them all presents of files, knives, needles, etc. and the women a mirror, small scissors, gartering and needles. After leaving them we came

on two other lodges and three men came to visit us, and further on two more which we did not visit as it was blowing too fresh. The men were short and stout, the women not bad looking, with clean faces tattooed the same as the females in Capt. Back's book. I regretted much not having the interpreters with us, so as to learn the route they take from Chesterfield Inlet (assuming that they came from there). 2 of Dr. Rae's men with me,<sup>147</sup> understand and speak a few words. Shortly after leaving the 2nd Esquimaux lodges a gale came on, which shortly after increased to a storm, which nearly swamped us; this was accompanied by showers of hail and clouds of sand which nearly blinded us. At last I gave up the contest and encamped near Bullen's River at 6 p.m. It was piercingly cold—capots, cloaks and blankets in general demand. Both yesterday and today we were much incommoded by (July, 1855—THLEWYCHO RIVER—41) sand and banks (Battues);<sup>148</sup> the Esquimaux also made us lose some time; they had evidently not heard of Franklin's party as we made them understand that white men who had come in ships had died from starvation at the mouth of the river. About 50 or 60 deer were seen today, but neither Musk Oxen nor geese; at the Esquimaux encampments many deer were lying at the water's edge till they get *high* enough for their taste—they were all does. Several fawns were lying close to the encampments apparently unalarmed. Several deer were also seen.

Sat. 21. Detained all day by wind and rain. (Entered narrows).

#### July, 1855—THLEWYCHO RIVER—42

Sun. 22nd. The gale of yesterday abated a little this morning, but the weather was still miserable when we left our encampment at 2½ a.m. When we reached Pelly's Lake we hoisted sail and carried it most part of the day. Encamped at the 2nd narrows in Lake Garry (Back's Enc't. of 20th) at 9 p.m. Saw 2 Lodges of Esquimaux at the Rapids between L. Pelly and Garry, but the inhabitants ran away on perceiving us; they evidently have intercourse with the Churchill Esquimaux, as there were 2 tin kettles in the Lodges, as well as our dogs.<sup>149</sup> I left a

147. The Report of the Select Committee on Arctic Expedition, 1855, p. 837, shows that Misteagan (as spelled by Rae) was with Rae. There are no published documents known to us giving a clue to who the other man was.

148. Should be "battures".

149. Evidently wrongly transcribed from "dags" as daggers were among the articles especially suited for the Eskimo trade mentioned in the Select Committee Report, 1855, p. 856, as having been forwarded for the expedition from York Factory.

140. Herring Gull and the Short-billed Gull, *Larus canus*, with juvenals. (P.A.T.)

141. *Lupinus arcticus* (A.E.P.)

142. Should be Jervois.

143. Ravens, *Corvus corax*. (P.A.T.)

144. These were Back River or Sangningajormiut Eskimo, an inland tribe that obtained its iron, glass beads and other European objects by trading with Qaernermiut Eskimo around Chesterfield Inlet. (D.J.)

145. Should be "boots".

146. *Canis lupus* and, probably, *Alopex lagopus* (R.M.A.)

few articles in each tent and left. A number of young fawns were running about the lodges—I suppose their dams have been killed. 2 bags of pemmican were cached at our enc't of last night. Very few deer seen; 30 geese were killed.

#### Course in L. Garry

(To 2d Detroit<sup>150</sup> E. by S.—mark a small island with gravel etc. shoved up by ice and crowned by square blocks stone in Situ but in a state of disintegration. Then through a labyrinth of islands and narrow bays to a prominent sand hill—thence to 3 d Detroit N.E. nearby mark a clump of sand hills or cut very picturesquely—thence to Rapid (point) N. by E.—mark a high conical sandhill.)

#### July, 1855—LAKE GARRY—43

Monday 23rd. Left at 4½ a.m. Lost most part of the day in finding our road. We were also retarded by cutting through ice 2 feet thick. Encamped at the 3rd Straits of L. Garry (Back's enc't 21) at 10 p.m. Either we are very stupid or the map in Back's work is very incorrect. The day has been the warmest we have had for some time. I shot a deer today, a doe I am ashamed to say, but we had no fresh provisions and the pemmican must be saved—the fawn was half grown and was of course allowed to live. On a bay surrounded by sandhills to the north of the sandhill at the end of the 2nd strait Esquimaux encampments and signs of this spring seen. From a height a chain of lakes leading to the N.E. were seen, by which road I think the Esq. come from Lake McDougall.

Tues. 24th. It was near midnight before the men laid down last night. I therefore allowed them to sleep till 5½ a.m. We rounded all the bays in consequence of ice; we were also much retarded by cutting our way through the ice at 3 points; it was from 2 to 3 feet thick. It is a curious sight to see men working on the ice at this date. We at last reached the rapid at the end of L. Garry to which we joyfully (*July, 1855—LAKE GARRY—44*) bid adieu. (It falls by 3 Rapids into the River leading to L. McDougall). This rapid was easily run; at its foot a cache of pemmican (1 Bag was made). The rapids

below this—5 in number—are all strong and dangerous with the exception of the last one, a little below which we encamped at 8¼ p.m.; 2 decharges<sup>151</sup> were made—at most of these rapids there are several channels. Capt. Back's map (the one affixed to his narrative) is on so small a scale as to be utterly useless in these large bodies of water. 17 geese were killed; no animals were seen with the exception of a young fox.<sup>152</sup> This has been the finest day since we left Slave Lake; clear and very warm; the refraction was very great. Esquimaux Ducks<sup>153</sup> seen.

#### July, 1855—LAKE MCDUGALL—45

Wed. 25. Left at 4 a.m. In about 3 hours paddling we reached an easy rapid, this led into an extensive sheet of water when the current became imperceptible; it ran on either hand N. & S. in deep bays. Land was seen in every quarter (Back said no land to be seen to the N.) Tho distant. From this we struck due south to the end of L. McDougall about 10 miles from the Rapid. The map is perfectly useless. We ran part of the Rock Rapids (3) but a decharge was made at the last one, after which we ran 3 Rapids and carried over the cascades and falls. We encamped at the foot of the latter (Sinclair's Falls). All these rapids are strong and hazardous. Our Iroquois Boates<sup>154</sup> have had fine opportunities—both yesterday and today of exhibiting their matchless skill. Saw 6 or 7 deer and killed 13 male Canada geese. Esquimaux marks were very numerous above the head of Rock Rapids and below them to this spot. Made a cache of 1 bag pemmican at the Cascades above this place.

(to be continued.)

150. Detroit, strait and narrows all mean the same, and all are used by Anderson, but it is interesting to note that he chooses the former for sailing directions.

151. In making a decharge the goods are unloaded (whence the name) and carried overland, and the canoes are run light.

152. Probably Arctic Fox *Alopex lagopus* (R.M.A.)

153. Later references in the Journal show that eiders are meant. Our meagre knowledge of this region suggests that the King Eider, *Somateria spectabilis*, in the species most likely to be found so far from the open sea. (P.A.T.)

154. Bowmen; should be "boutés".



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CORRECTION

Mr. G. Winston Sinclair advises that in his paper "The Genotype of *Conularia*" in the May issue, pp. 72-74, the word "Subgenera" in the 4th line from the bottom of the 2nd column, p. 73, should be deleted. In the 12th line from the bottom of the same column after "Genus *CONULARIA* Sowerby 1821," the words "including as subgenera *Conularia* (s.s.)" should be inserted.



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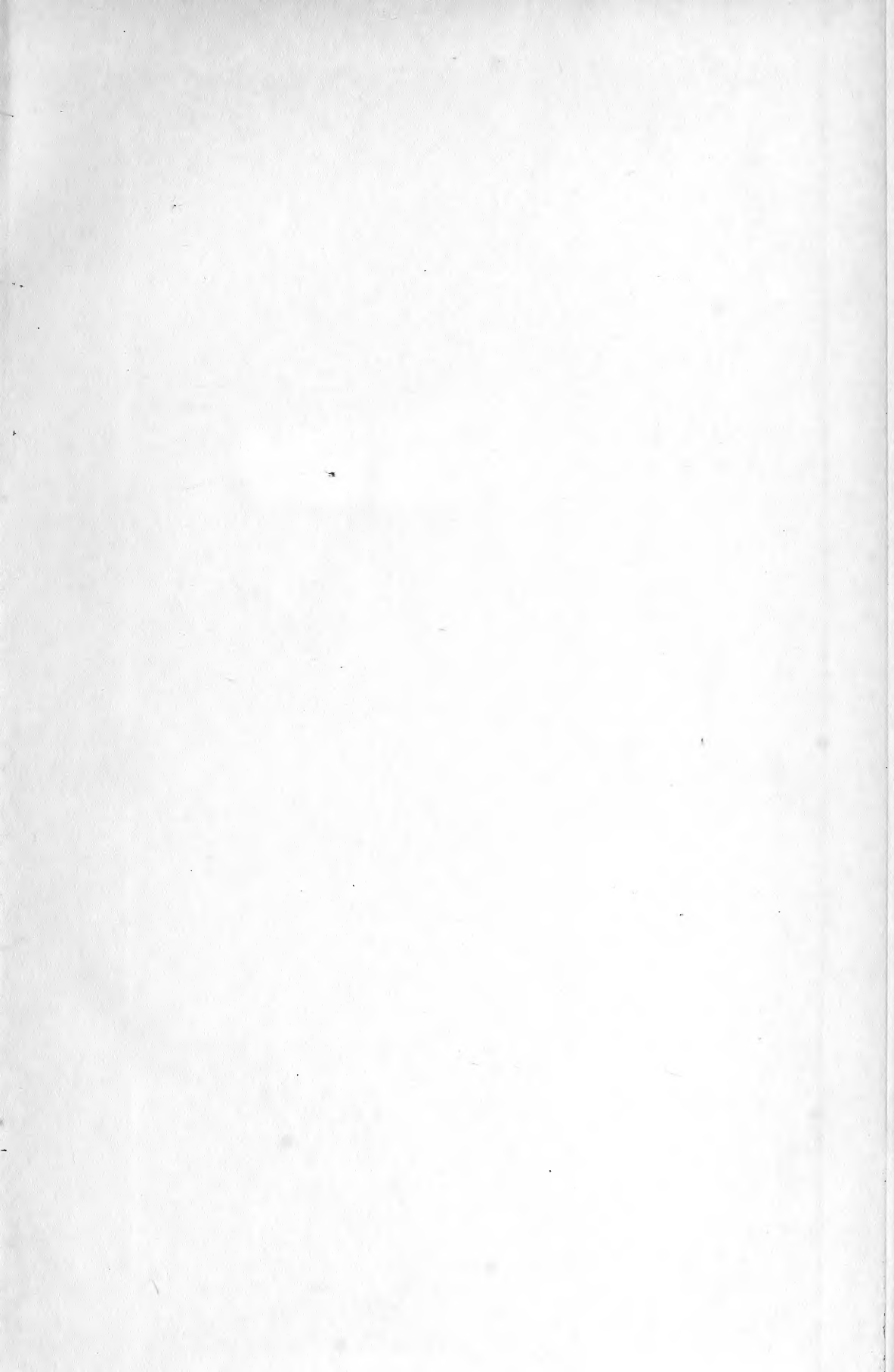
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